ENGINEERING
LIBRARY

JAN 5 1950

January 2, 1950

STEEL

The Magazine of Metalworking and Metalproducing

ENTS — PAGE 91

new tools for the master mechanic

CRUCIBLE'S NEW 66" 4-HIGH REVERSING HOT STRIP MILL AT MIDLAND WORKS.

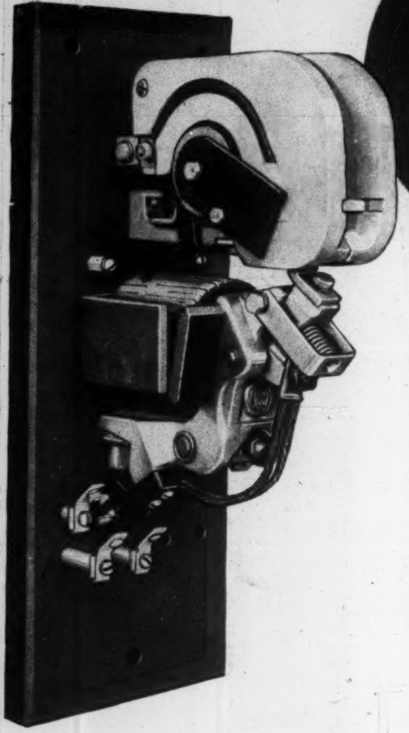
This most modern mill is part of Crucible's $18,000,000 worth of new tools at Midland Works to help furnish you the finest quality possible in stainless and alloy sheet and strip in grades and finishes from ½" to 50" inclusive.

CRUCIBLE STEEL COMPANY OF AMERICA
405 Lexington Ave., New York 17, N. Y.
Branches, Warehouses and Distributors in Principal Cities

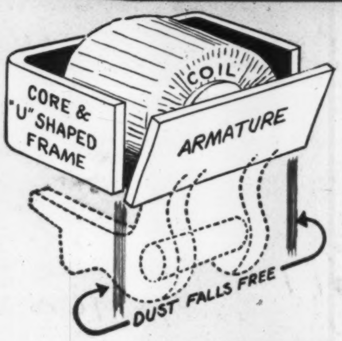
CRUCIBLE first name in special purpose steels

hot and cold rolled **STAINLESS SHEET AND STRIP**

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

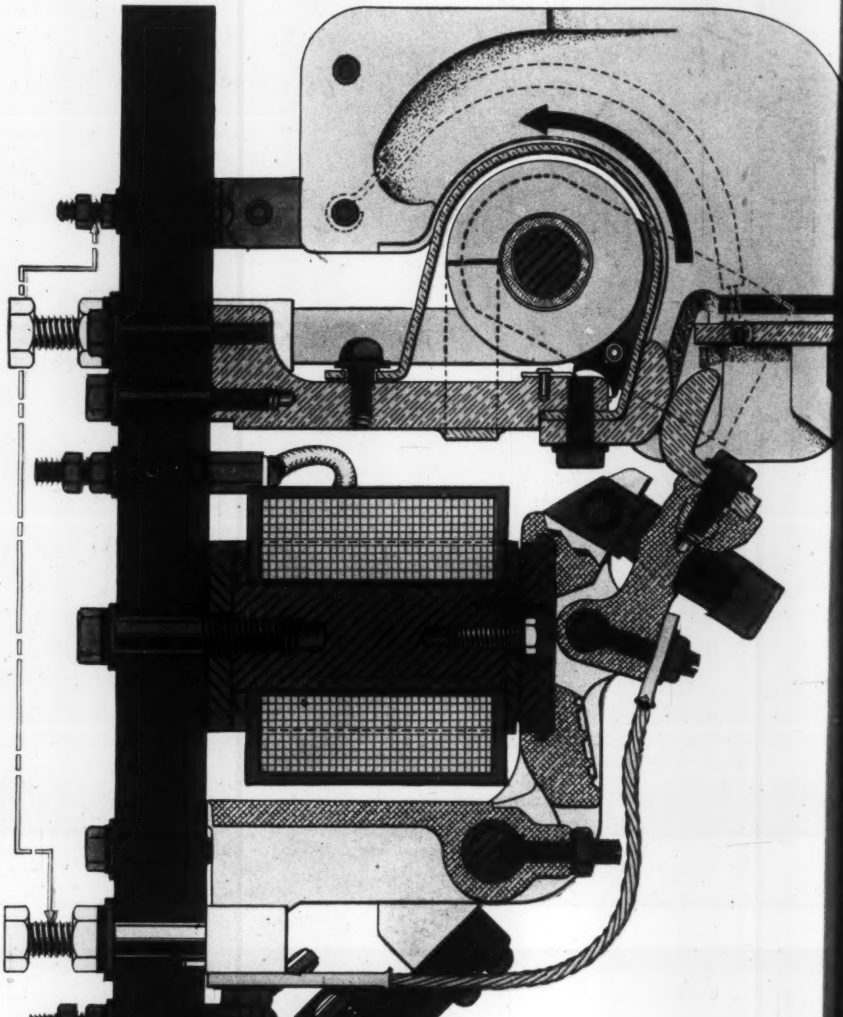


IMPROVED
EC&M *LINE-ARC* Contactor
CUT OPERATING COSTS



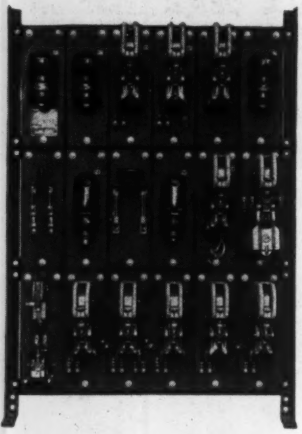
NEW Magnetic Circuit is unrestricted below the air gap

Magnetic dust free to fall. No mechanical shelf to catch it—dust does not pile up in air gap nor pack in, requiring manual removal. EC&M has licked the dust problem.



EC&M *LINE-ARC* Contactors have been improved with a new magnetic circuit and safer electrical interlocks. Remaining unchanged are all current-carrying parts and the well-known EC&M *LINE-ARC* principle, which provides high arc-rupturing ability and long contact life through cool contact operation.

EC&M Contactors of *LINE-ARC* design have a long-standing reputation for efficient operating results. Now, these recently improved contactors give performance far superior to any previous standard of comparison. When buying crane and mill auxiliary controllers—specify EC&M *LINE-ARC* Contactors.



CRANE CONTROLLER

SAFER INTERLOCKIN

Double-break, coin-silver c
tacts with normally-open c
cuit *insulated* from norma
closed circuit; no carry-o
from one to the other by an a

THE ELECTRIC CONTROLLER & MFG. CO
2698 EAST 79TH STREET • CLEVELAND 4, OHI

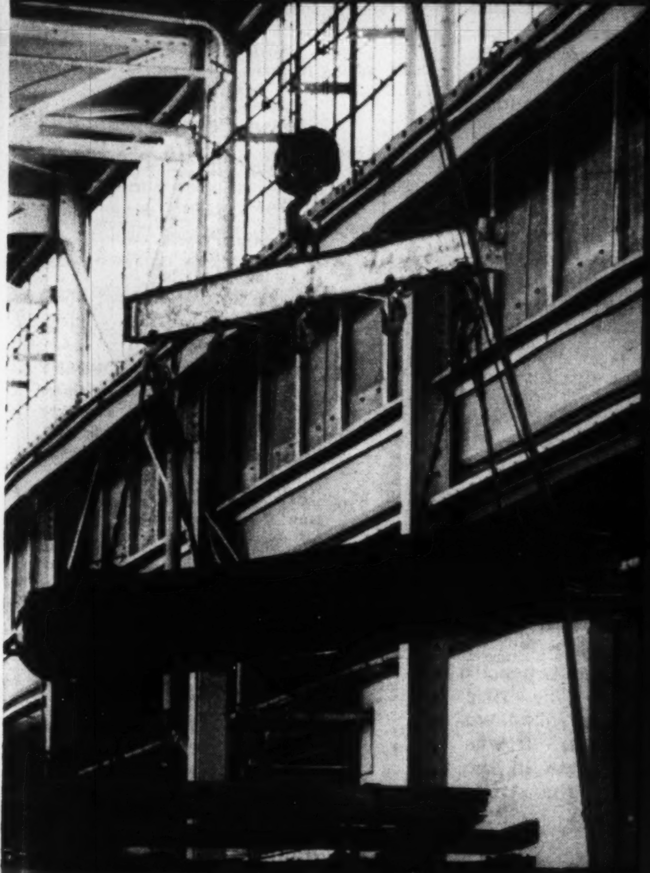
SPECIFY
BOTH

1 Macwhyte Wire Rope

for your cranes and hoists . . .

Because Macwhyte manufactures "a thousand and one" wire ropes, you can select a wire rope of exactly the correct size and construction for your equipment. Because you get the rope best suited for your equipment, you get economical service!

Whatever your lifting problem, our engineers will be glad to give you the benefit of their specialized experience. Write direct to Macwhyte Company or your Macwhyte Distributor.



2 Macwhyte Slings

made to order for safe handling . . .

Macwhyte manufactures ATLAS Round Braided Wire Rope Slings, DREW Flat Braided Slings, and MONARCH Single Part Slings. You get lower-cost, more efficient handling because there's a Macwhyte Sling that's the right sling for your handling work. Macwhyte Slings are equipped with necessary fittings and come to you complete, ready to use!

A thousand and one

made by

all job-proved . . .

Macwhyte Company, 2912 Fourteenth Avenue, Kenosha, Wisconsin. In addition to PREformed, Internally Lubricated bright steel wire rope and Braided Wire Rope Slings, Macwhyte Company manufactures Stainless Steel, Monel Metal and Galvanized Wire Rope, Aircraft Cables and "Safe-Lock" Cable Terminals. Macwhyte distributors throughout the U.S.A. and other countries. Mill depots in the following cities: New York, Pittsburgh, Chicago, Minneapolis, Fort Worth, Portland, Seattle, San Francisco, Los Angeles.

MORGAN
WORCESTER

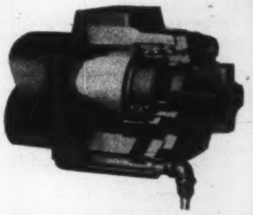
5-STAR SERVICE

for efficient production

MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS

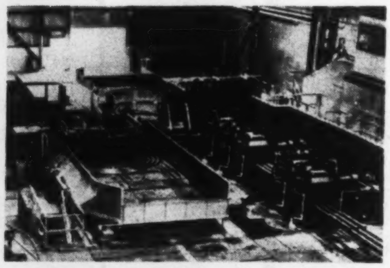
English Representative: International Construction Company
56 Kingsway, London, W.C. 2, England

RM-26



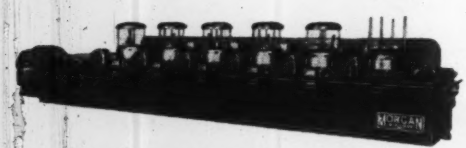
Morgoil Roll Neck Bearings

. . . will increase the accuracy of your product and save on operating and maintenance costs.



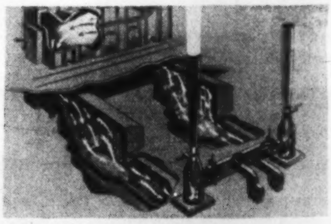
Continuous Rolling Mills

. . . built by specialists with over 60 years of pioneering in the field.



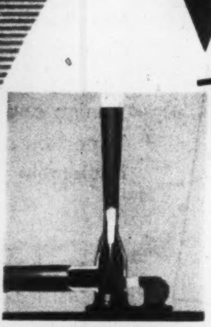
Wire Machines

. . . Morgan-Connors give high production, with low die cost, low power cost, low space requirement.



Furnace Control System

. . . Morgan-Isley increases efficiency of any regenerative furnace at relatively low installed cost.



Air Ejectors

. . . efficiently handle hot gases and fumes as high as 3000° F.

AS THE EDITOR VIEWS THE NEWS

January 2, 1950

Improve, Not Abandon!

Fifty years ago, at the turn of the century, the American people were cocky, enthusiastic and optimistic. They were cocky over winning the Spanish-American war; enthusiastic over their newly acquired responsibility in world affairs as stewards of Cuba, the Philippines and other islands; and optimistic over the promise of marked improvement in the domestic economy of their nation.

Little did they know how trivial were the accomplishments over which they gloated compared with the things that have been actually achieved during the past five decades. Twice has the nation delivered the decisive punch in wars which dwarf the 1898 affair into relative unimportance. Today our responsibilities to the world are tremendous compared to our limited chaperonage of 1900. At the dawn of the second half of the century, we find our domestic economy has advanced more in 50 years than the most reckless prognosticators in 1900 dared hope for in a full century or more.

Why has this nation moved to the front in such commanding fashion? At the turn of the century England, Germany, France and Russia and possibly others had as good or an even better chance for prosperous development than had we. Why have we outdistanced them by such a decisive margin?

There may be many reasons, but an outstanding one is that our system of competitive enterprise enabled tens of millions to own and enjoy comforts of life which in many other countries are owned and enjoyed only by the wealthiest persons. Equally important is the fact that this bountiful system which provides more goods for more people at less cost has been developed—at least until recently—with a minimum encroachment upon the freedoms of the individual.

As we enter the second half of the century, we are confronted by a strong contingent of politically-minded persons who are trying to persuade the American citizen to exchange individual opportunity and individual freedom for mass security and mass regimentation. They are prescribing almost the identical medicine which, taken in smaller or larger doses by England, Germany, France, Russia and other aspirants to world leadership during the past half-century, has led them to misfortune or dictatorship.

Our cue is to improve our system, not to abandon it.

* * *

LAST-HALF CHALLENGE: In improving our industrial system, emphasis during the last half of the century is likely to be placed on the personal problems of the individual.

If you will read the contributions to this publication's "1950 Annual Forum on Technical Progress in Metalworking," you will be impressed by the variety and volume of technical developments which promise better and cheaper ways of producing, fabricating, finishing and distributing goods. You cannot escape the feeling that the technicians who deal with material things—metallurgy, machining, forging, steelmaking, etc.—are far ahead of the specialists who are charged with dealing with the human element in industry.

One of the big, unsolved problems of the second half of this fabulous twentieth century is the development of something attractive and worthwhile which will take the place of the traditional pride in craftsmanship which has been taken away from workers in whole or in part by mass production techniques.

This problem goes far beyond the issue of

(OVER)

AS THE EDITOR VIEWS THE NEWS

adequate compensation for hours worked and of security as measured in insurance and pensions. It is a matter of making the employee feel that he is more important in the scheme of production than a mere automaton—a pusher of buttons. It is probably the biggest challenge to be met if we are to preserve our cherished system of competitive enterprise. To meet it calls for a fresh attempt by management to understand the spiritual needs of employees under present day conditions of employment. —pp. 99, 165

* * *

4-FOLD GAIN IN DECADE: Readers of this publication are interested primarily in the metalworking industry. They should be proud to be identified with America's leading industry and should be elated at its progress during the past decade.

The metalworking industry comprises iron and steel production, nonferrous metal production, electrical machinery and equipment, machinery except electrical, automobiles and equipment, transportation equipment except automobiles and instruments. Total sales of all of these component groups was $17,680 million in prewar 1939. In 1949 it is estimated that the total is $73,874 million. This tops the wartime peak and is second only to 1948's figure of $74,959 million. Quadrupling sales in a decade—even allowing for the factors of war and inflation—is noteworthy. —p. 124

* * *

MORE FOR YOUR MONEY: In purchasing productive facilities, can you buy more or less with your money today than you could a few decades ago? Charles J. Stilwell, president of Warner & Swasey Co., answers in these words:

"In relation to a turret lathe built in 1915, having a productive index of 100 and costing $2898 in present-day currency values, a 1949 machine costing $9690 has a productive ability of 300. The 1949 machine costs about three times the price of a 1915 machine, but can produce three times as much; hence it would take three of the earlier machines with three operators for production equivalent to what one operator can turn out on a single modern turret lathe. In spite of its higher first cost, a 1949 machine is more profitable than the older machine by wages of two operators and overhead on two machines."

Using this formula to compare older machines in plants with the latest models available might convince users that in many instances they simply cannot afford not to replace the old with the new. —p. 260

* * *

MOTORDOM AIMS HIGH: Consensus in motordom is that output of motor vehicles in 1950 will fall 10 to 12 per cent below that of 1949. This means assemblies of about 5,845,000 cars and trucks in the United States and Canada in the new year, as compared with the all-time high of 6,565,000 in 1949. Everybody looks for a brisk first-half, but opinion differs as to what may happen in the second-half.

One school of thought holds that some industry officials underestimate the nation's ability to "consume" motor vehicles. In prewar 1939, only $3.10 of each $100 consumer spending went for automobiles and parts; today $6.20 of each $100 goes for cars and parts. Market researchers estimate a replacement demand of 3,600,000 to 4,300,000 vehicles and a new owner demand of 1,300,000 to 1,900,000, or a total of from 4,900,000 to 6,200,000 a year over the next five years—assuming a continuation of fair economic weather. —p. 115

* * *

UNDOCTORED STATISTICS: World production of steel ingots and castings in 1949 totaled 167,431,000 tons, the highest output in peacetime and second only to slightly higher outputs in the peak war years of 1942 and 1943.

The comeback of steel-producing countries affected by wartime destruction is illustrated by the fact that in 1949, the United States accounted for only 46.35 per cent of world output. During the peak of the war, American steel producers were accounting for 54 per cent or more of world output.

This publication's figures on world production of steel ingots, pig iron and ferroalloys are part of a 32-page section devoted to statistics of the metalworking industry. In this section you can find practically everything that is available from this nation's sources of statistics on metalworking. You may want to keep this section for reference. You should be thankful that your nation still affords accurate figures, undoctored for propaganda purposes.—pp. 123-154

E. L. Shaner

EDITOR-IN-CHIEF

1950 Metalworking Yearbook

STEEL . . . *January 2, 1950*

Summary

BUSINESS PROSPECTS— Business in 1950 should be about a carbon of the 1949 economy—not quite so good but still satisfactory (pp. 99-108). Look for the metalworking industries to do a gross volume of $70 billion this year. That will be off from the estimated $73.9 billion done in 1949, but the year should still rank as one of the four best of all time. Steel ingot output in 1950 should be between 72 and 78 million tons. The 1949 production is estimated at 77.6 million tons. Gross national product for 1950 should hit $250 billion. In 1949 it was about $258 billion. The Federal Reserve Board's production index may average between 170 and 175. The 1949 average was about 175 per cent (1935-1939 = 100). Expect a full-tilt first quarter, but a tapering-off period to follow. As 1949 was a labor year, so 1950 will be a price year. Prices will edge up in the first quarter, but competition may whittle them down again later. Your most difficult labor-management problem in 1950 and for years to come will be: What to do about social security? Despite the pension rush in 1949, only 9 per cent of those people gainfully employed are yet covered by private company plans.

GOVERNMENT— Much of the business weather in 1950 will depend on the political climate in Washington (p. 110). Some proposals Congress will act upon in the coming year are sound; others are not. A promising development will be the formulation and adoption of a single consolidated appropriation act. Congress for the first time will bear full responsibility for fiscal policy. Tax revisions are promised that will aid business. An ominous proposal is an antimonopoly bill that in its present form contains a joker permitting the FTC to block the sale of a business to a competitor.

AUTOMOBILES— Motordom set new records right and left in 1949. Even if production slips in 1950, the year will still be one of the best (p. 115). Despite strikes in steel, coal and the industry itself, 6,565,000 cars and trucks were assembled last year in the U. S. and Canada. In 1950 this production may decline by 10 or 12 per cent. Provided economic conditions are good, automakers think that demand for cars and trucks will hold at between 5 million and 6 million a year over the next five years.

FACTS AND FIGURES— How does U. S. iron and steel production compare with Russia's? You can get the answer by turning to p. 126 in the statistical section (pp. 123-154) where steel output figures for every major nation of the world appear. Do you want to know in what month of 1949 the American industry turned out the most steel? You'll find on p. 127 that it was in March. Do you know that more cold-rolled sheet steel than hot-rolled was produced in 1949? You'll discover the tonnages and other details of the product mix on p. 130. What was the wholesale price index in 1939? These and other business indexes appear on p. 131. What about steel prices? Average monthly quotations in 1949 are listed on p. 134. Do you know that the price of aluminum now is 3 cents less per pound than it was in 1938? That and other facts about nonferrous metals appear on pp. 135-139. More than 170 metalworking subjects are treated in the statistical section.

TECHNICAL FORUM— Technological progress is one of the few ways left for you to lower your cost structure, now pushed to a giddy height by high labor rates and other factors (pp. 165-262). More know-how on structure of materials and increasing supply of new metals will provide fabricators with added flexibility (p. 166). Foundry operations need further mechanization (p. 171) to show profits. Advances in forging, forming and welding are expected to speed production-line processing (pp. 175, 179). Competition is making many companies more receptive to new methods (p. 190), more modern machine tools (p. 240), improved heat and surface treating procedures (pp. 200, 204). Handling aids (p. 216) will help cut costs. No drastic expansions are expected for steelmaking (p. 224). That industry expects to concentrate mostly on replacement of deteriorated equipment and augmentation of coke and iron ore supplies.

Inland, too, Blends Ingredients ...for Steel to Fit Your Needs

Just as the judicious chef blends his sauce to suit the individual tastes of his patrons . . . Inland prepares steel to meet the specific requirements of its customers. Being an independent and completely integrated company, Inland is in a position to render this service . . . to furnish *job-fitted* steel for your needs . . . and to act quickly when fast action is necessary. What's more, at Inland, your orders for steel—as well as your steel problems—are treated with friendly, personal interest. Through each phase of production, *your* steel is checked and rechecked to insure its absolute conformance to your specifications.

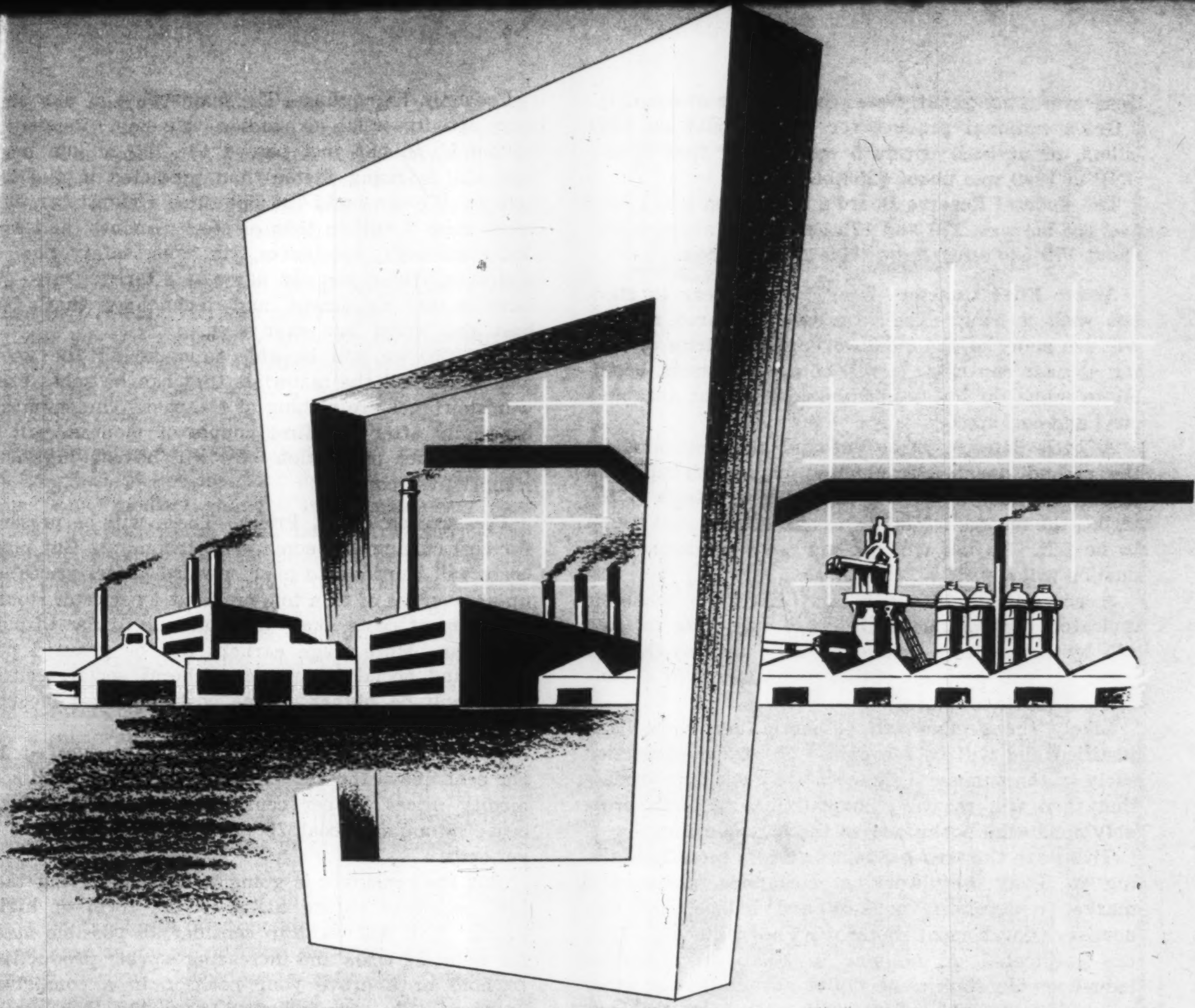
INLAND STEEL CO., 38 S. Dearborn St., Chicago 3, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, and St. Paul.

INLAND STEEL

BARS • STRUCTURALS • PLATES
SHEETS • STRIP • TIN PLATE
FLOOR PLATE • PILING • RAILS
TRACK ACCESSORIES

. . . and
This "Inland Team"
Gives Your Steel
Their Personal Attention

METALLURGY
SALES
OPERATIONS



METALWORKING Prospects for 1950

. . . and imprints of 1949

AMERICA'S 1950 economic vehicle will be almost the same as the 1949 model. A little less trim, not quite so fancy, but still plush enough to carry us through the year in good style.

The metalworking industries can expect a gross volume of $70 billion this year. That will be a little less than the estimated $73.9 billion in 1949 (pp. 124, 125), but still should rank as the fourth highest year in history.

Steel ingot production in 1950 probably will be between 72 and 78 million tons. Steelworks operations will average between 75 and 82 per cent of capacity. Last year's output is figured at about 77.6 million tons, with operations averaging slightly over 80 per cent of capacity.

Gross national product for 1950 should be $250 billion, or at least within 5 per cent of that figure. GNP in 1949 was about $258 billion.

The Federal Reserve Board's production index may average between 170 and 175. The 1949 average was about 175 per cent of the 1935-1939 average.

Active First Quarter—Look for the year to start out with a bang. The first two or three months will see many of the metalworking industries operating at near capacity. It will be a replacement boomlet to make up for production lost in last autumn's steel and coal strikes.

A little later, possibly around the beginning of the second quarter, production will catch up with demand. And that's when the deferred effects of the strike, the income lag of the fourth quarter, will begin to be felt. Buyers will become more cautious. Production will slip.

A correction will set in and drive the economic indicators down. The FRB index may slide to, say, 155 by July. Steel production may drop to the low point of last summer. Other indicators will decline in comparable measure.

Likely the decline will be more than actually is justified and will be recognized as an overcorrection early in the summer. Chances are good that production then will recover substantially, although probably not to the boom level of the first quarter.

These are the trends STEEL's editors see after talking to many metalworking executives, commercial market researchers, bankers and independent economists (government soothsayers not included). They are predicated on no war in 1950, no prolonged industry-wide strikes, no dollar devaluation or other now unforeseeable inflationary actions by the government. Opinions vary as to the timing, but most economists are agreed on the general pattern.

Economy Expanding—The mainspring of our business activity is an expanding economy. Population in the U. S. has just passed the 150 million mark and still is rising faster than predicted in the last census. We can build 700,000 autos a month, produce more than 8 million tons of steel a month, and turn out machinery, appliances, tin cans, safety pins or almost anything you can name at a terrific rate. We have plant, equipment and technology that's the best the world has ever seen.

In 1950, we will be able to make all the goods and supply all the materials that can be sold. Postwar shortages are a thing of the past. The emphasis, especially after the first couple of months, will be on sales, not production. We will have a high-level competitive economy.

Pressure on Costs, Prices—There will be pressure for cost-cutting and some price trimming. But many costs will continue to push upward. Steel prices are up an average of $4 a ton, or about 4 per cent. Hourly employment costs likely will continue to rise through the year. More wage earners will be granted pensions and social insurance. Federal social security taxes will be higher. Some cost increases incurred in 1949 will show up in 1950 prices.

Hourly steel employment costs have jumped 137 per cent above the 1935-1939 average; all retail commodity prices 87 per cent; cost of living 68.5 per cent; bituminous coal 79 per cent; freight rates 61 per cent.

But the consumer is going to balk at having these cost increases passed along in the form of higher prices. You will want to consider all possible means for reducing costs and increasing worker productivity to hold or improve your position in a competitive economy. The auto industry (page 115) has chalked up some nice gains through cost cutting methods.

Although the general price level may go up in

Sam, the spender

JANUARY— President proposes military and economic aid to foreign countries . . . He suggests government may finance industrial expansion . . . Steel mills withdrawing from remote markets . . . Supreme Court rules: Closed shop labor contracts can be prohibited by state laws, Jan. 3; employers not required to bargain with foremen's union, Jan. 10 . . . ICC grants interim rail and water freight rate increase of 5.2 per cent, Jan. 11 . . . Pension demands come to fore in 1949.

FEBRUARY— Two-year moratorium proposed on antitrust prosecutions against delivered-price systems and freight absorption practices, Feb. 2 . . . Voluntary steel allocation program extended to Sept. 30 by Congress, Feb. 7 . . . Conveyor belt proposed between Lake Erie and Ohio river, Feb. 10 . . . Steel supplies easing.

the first quarter, it likely will slip as soon as the replacement boomlet is spent. The decline will not be large. The consumers' price index probably will drop a few points, but hardly more than 3 to 5 per cent. Farm prices may take a rather sharp dive, depending on government support policies.

Prices for metalworking products are likely to hold on a fairly even keel. Some will have to come down, a few may increase moderately.

Some of the reductions will not be absolute declines. Rather they will be effected through the offering of more standard models, with less deluxe trim and fancy work.

Revolution in Steel Buying Habits—Revised extra charges just placed in effect by steel producers will cause revolutionary changes in metalworking companies' buying habits. The new extra charges are designed to place all steel products on a more uniform profit basis and to reflect technological progress of recent years. Wide sheets are easier to produce on the big continuous mills than are narrow sheets. The new extras therefore are reduced on wide sheets and increased on the narrow widths. In 22-gage cold-rolled sheets 60 inches wide, extra charges are reduced $10 a ton, while the extras for 20-inch sheets are increased $9 a ton.

Many users will investigate the costs of installing their own slitting equipment. Others will want to redesign their products to use more wide sheets.

The whole matter of extra charges will be reviewed by steel buyers and changes in buying habits made on the basis of economies that can be effected in changes in manufacturing methods, handling and product design. Many users may find commercial quality steels can be used, and that quality extras can be minimized. Metalworking executives will find that large savings can be made through knowing their products and fabricating processes and through intelligent specifying on steel purchased.

More Emphasis on Sales Effort—Much has been said about intensifying the sales effort during the past year or so, but many companies still have a big job to do. Alert metalworking managements are combing over their sales forces, inaugurating new salesmen training courses, seeking ways to make their advertising more effective, studying shifts in markets and buying habits.

New product designs already are making their appearance. Others are ready to go into production. Appliance makers already have been forced to bring out standard models to sell at lower prices than those offered during the postwar shortage. Auto builders are paying new attention to smaller models. The consumer is being given an opportunity to buy what he wants.

Biggest steel month in history

MARCH— President's request for authority to build steel mills rejected by congressional committee, Mar. 2 . . . John L. Lewis orders two-week "memorial" strike starting Mar. 14; he objects to appointment of James Boyd as U. S. Bureau of Mines director . . . GE rejects demand for fourth-round wage increase . . . Government relaxes controls on consumer installment buying, suggesting inflation no longer threatens . . . Declining demand for conversion, alloy and some silicon steels shuts down some steelmaking furnaces . . . Unemployment on the increase; though higher than anytime since 1942, it's still well below prewar average . . . Household appliance manufacturers cut prices to stimulate sales . . . Buyers' market returns on more metalworking products.

What Will Government Do?—Any appraisal of business prospects depends to a great extent on what the government does or what it does not do. Will it continue deficit spending? Will it manipulate controls to encourage inflation or deflation? Will it modify tax laws to give business a chance to expand and grow on a sound basis? Will it liberalize depreciation regulations? Will it even try to provide a favorable economic climate?

Especially bothersome to industry has been the policy on plant and equipment write-offs. Rigid rules prohibit rapid amortization except in isolated instances. That may be one reason why planned plant and equipment expenditures for the first quarter this year are off. Business, exclusive of agriculture, plans to spend about $3.8 billion, or 14 per cent less on new plants and equipment in the next three months than it did in the comparable 1949 period.

More Deficits Coming — Deficit spending by the federal government apparently will continue, despite demand in Congress to trim the budget to fit income. Federal budget deficits came back into the postwar picture with a relatively moderate one in fiscal 1949 and will continue with a much larger red figure for the current fiscal year. Unless Congress in the election year of 1950 should take the unpopular

"High level" recession

APRIL— Premium prices disappearing on steel products . . . Improved steel supply reflected in reduction of voluntary allocation programs for July . . . Turbo-Hearth steelmaking, combining benefits of open hearth and bessemer, announced . . . Supreme Court rules employers must bargain with unions on pensions, Apr. 25; upholds FTC ban on basing point pricing in sales of rigid steel conduit.

MAY— UAW-CIO strikes at Ford's River Rouge and Lincoln plants, May 5 . . . Buyers' market appearing in Europe . . . USA-CIO tells steel producers it wants to negotiate on wages, pensions and insurance, May 16 . . . Crucible Steel Co. completes $18 million expansion at Midland, Pa., May 20 . . . Union shop agreements, forced by John L. Lewis on captive coal mine operators, ruled illegal by NLRB, May 27 . . . Ford strike ends May 29.

—and unlikely—step of increasing taxes, it will be difficult to avoid another deficit in fiscal 1951 without a radical change in government spending habits. There is no use dreaming about any change by government. Mr. Truman is a spender.

Federal deficits are an old story now. But the present imbalances are something new. They come at a time when the economy is on an unprecedentedly high plateau of activity. For 16 straight years beginning with 1931 we had deficits, but in much of this time business was either depressed or we were at war.

If the budget can't be balanced when business is steaming along at record heights, then when can it be balanced?

Veterans To Get Bonuses—Giving an inflationary nudge to the economy in 1950 will be the government payments to veterans of nearly $3 billion in insurance refunds. This begins soon.

The tempo also is accelerating for payments on government savings bonds. An estimated $1 billion worth of bonds sold in 1940 mature in 1950. Sales of these began picking up in 1940. For the next five years maturing dates for these issues will be coming thick and fast.

Yet another factor contributing to the heady atmosphere of government-nourished inflation is the possibility of war or of accelerated preparedness for war. Away from Washington, people think they are still in the postwar era. But in the capital, you'd think we are in a prewar state. Defense preparations are sure to boost many a metalworking company's sales volume; the extent depends on developments yet to come. If greater war dangers develop in the next 12 months, we could go on an economic jag which would throw all present calculations completely awry.

Something else which may upset economic planning could be another labor uprising for this year such as we had last. That's possible, but not probable.

Pensions Still No. 1 Labor Problem

Your most perplexing labor-management relations problems in 1950 and for several years to come will revolve around labor's persistent demands for social security.

Comparatively few workers are yet covered by private company pension plans, despite the pension stampede last year. At the beginning of 1949, an estimated 4,050,000 persons were covered by private pension plans. About 1,250,000 more are covered by plans adopted last year. That makes total coverage under private company plans about 5.3 million, or 9 per cent of the gainfully employed. At least several million more will be covered by plans to be considered over the next few years.

Thinking To Be Revised—Many of the pension plans adopted last year were written under duress. Big Labor, supported by an administration which thought it owed a political debt to the unions, dictated many of the provisions. Financing provisions of some plans are unorthodox. They shift to the future problems which should be handled currently. Many are really five-year plans set up on a pay-as-you-go basis. We acted in haste. We may repent at leisure.

In the next few years, much of the thinking on pensions—by employers and workers alike—will have to be revised.

Management will insist on sound financing methods and on plans which provide sufficient flexibility to permit the company to meet the costs under all probable business conditions. Employers will want plans which take into account the length of service and the earnings of the workers. They will want plans which provide adequate benefits to retire superannuated employees.

Joe Smith down in the shop also is going to want some changes. He will want a plan which includes vesting before he reaches retirement age. He will want a plan which permits him to change employers without losing his benefits. He may want some fringe benefits which are not provided in the program forced upon employers in 1949; possibly he will insist on some protection for his wife if he dies before she does.

That means management, labor and the government will have to take another good long look at the whole retirement plan problem.

Expand Social Security?—More and more businessmen are suggesting that the ultimate solution to the problem may lie in expanding federal social security legislation to provide more adequate benefits and greater coverage. It represents a change in thinking by many who early last year strongly opposed further intrusion by the government in this field as statism. It took last year's pension hullabaloo to change their minds—and the change is made reluctantly.

Many small companies hope that expansion of federal social security will relieve the pressure on them for private retirement plans and they may escape the headaches of setting up and administering a pension program.

Larger companies generally have geared their plans to federal social security. If social security is expanded, it may mean that their costs are reduced.

Some thinking in social security expansion runs in terms of flat $100 a month minimum pensions for all workers under the federal government system.

A more moderate school believes social security benefits should be liberalized in amount and in coverage to provide minimum subsistence requirements for retired workers. Social security benefits then could be supplemented by private company plans where feasible and desirable.

Bill Before Congress—H. R. 6000, a bill to expand social security benefits and coverage, soon will be taken up by the Senate. It already has been passed by the House.

H. R. 6000 would raise benefits an average of 70 per cent. Maximum pensions would be $150 a month. About 10 million more workers would be covered, or about 80 per cent of the working population.

It would cost more money. The taxable salary or wage base would be raised to $3600 from the present $3000. Tax rates under the present law went up Jan. 1 from 1 per cent for employer and employee to 1½ per cent; this rate would not be changed under the proposed bill. But the schedule of future tax rates would be higher. In 1955 they would go to 2 per cent, then to 2½ per cent in 1960, to 3 per cent in 1965 and to 3¼ per cent in 1970.

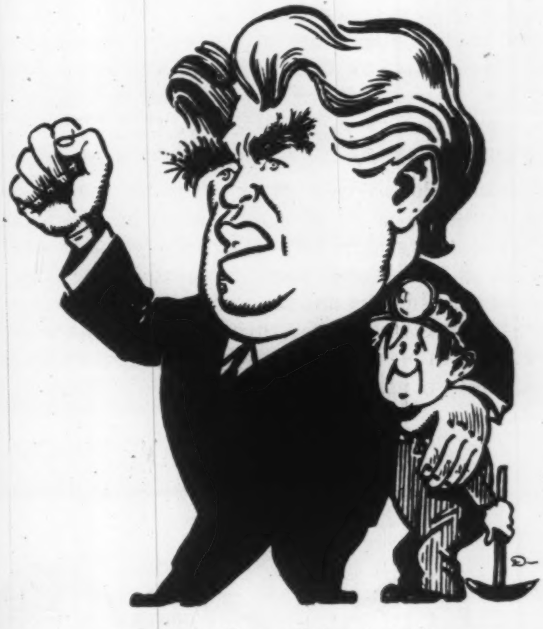
What Will Unions Say?—The big labor unions consistently have plugged for expansion of federal social security. But if H. R. 6000 is enacted, their contribution toward pensions will rise sharply. Their benefits under those plans geared to the social security plan, such as the Ford and steel industry plans, will not necessarily increase. Passage of H. R. 6000 would make—in effect—contributory plans out of the "noncontributory" private company plans they fought so hard to obtain.

The answer to this question should be no puzzle to any one experienced in labor relations. The unions will demand amendments to private plans to provide for minimum employer contribution and thus increase the retirement benefit.

Fringe Costs To Increase—Regardless of what eventual solution is found to the retirement problem, you can count on substantial increases in your fringe labor costs.

Companies which have granted pensions find that the cost is terrific. Few plans granting substantial benefits cost less than 10 cents an hour. Many cost much more.

Even before pensions became an industry-wide



Mr. Lewis: Thou shalt not work

JUNE— Senator O'Mahoney introduces substitute pricing measure legalizing freight absorption, June 1; passes Senate same day . . . John L. Lewis orders one-week strike in eastern and western coal mines as a "brief stabilization period of inaction," June 13 . . . Electrical workers start negotiations with GE, June 14 . . . M. N. Landay Co., Pittsburgh, buys Phoenix-Apollo Steel Co., June 21 . . . Soft coal contracts expire in middle of miners' ten-day vacation period starting June 25; Mr. Lewis orders all bituminous mines east of Mississippi river on three-day work-week, June 30 . . . Labor pot comes to boil . . . Business trend continues downward . . . More unemployment, more price reductions.

problem, paid vacations, paid holidays, social insurance, workmen's compensation, unemployment insurance and social security were adding up to a tidy sum per hour.

You will want to start thinking in terms of "hourly employment costs." "Hourly wage rates" and "average hourly earnings" are being made meaningless by the expansion of fringe labor costs.

Jurisdictional Disputes—Just because pensions are placed at the top of the list of labor problems, don't think there won't be others.

You probably cheered last November when the CIO kicked out the leftist unions, but if you have contracts with these leftist unions, you may be in for some stormy times.

The commie unions and the rightist unions are braced for a bitter fight for representation. Although the odds appear to favor eventual victory by the right-wing unions, the next two or three years are likely to be turbulent. The fighting unions may make your plant their battleground.

Drive for White Collar Workers—Big memberships are essential to the power of big unions. They are looking for new fields to organize. Watch for campaigns to unionize more white collar workers this year. The American Federation of Labor has singled out clerical workers for its drive to obtain "a million new members in 1950." The CIO likewise has moves underway to sign up more white collar workers.

Shorter Work-Week—Every dip in the business trend brings up a lot of conversation in union circles to reduce the standard work-week—without any reduction in take-home pay. Resolutions to this effect are found in the annual conventions of the unions. While it is doubtful if a drive for a shorter work-week will take on large proportions in 1950, it is a possibility if unemployment rises.

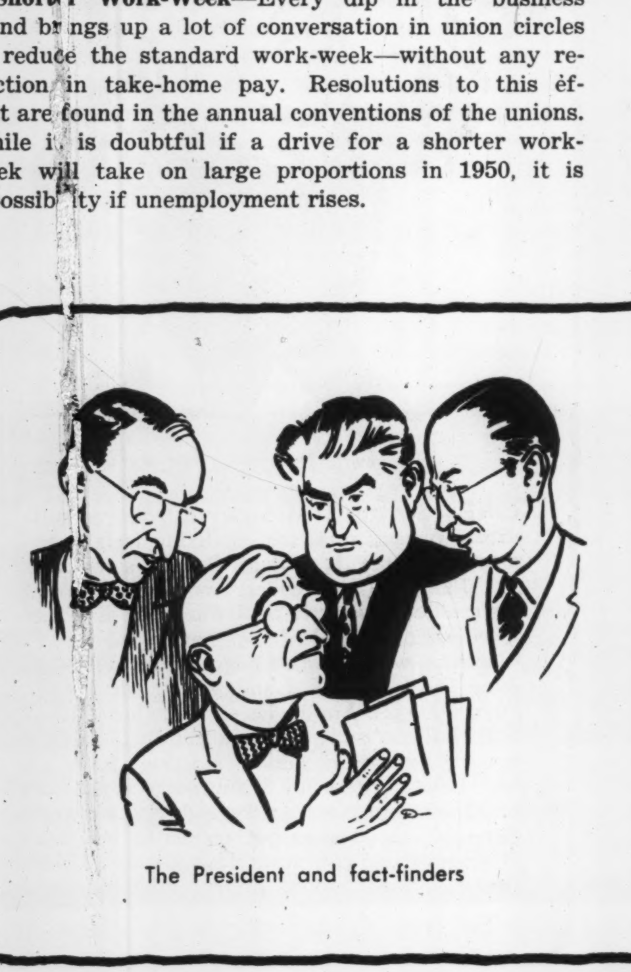
The Outlook by Industries

But increased unemployment and a severe business decline are not expected in component industries of metalworking during 1950, except in railroad equipment. Detailed statistics for production, shipments and sales begin on page 125. Here are the highlights of the industry-by-industry outlook:

Automobiles—The stellar performer on the metalworking stage won't put on quite as brilliant a show in 1950 as in 1949, but the performance will still be fine enough for a good year's run. The record production of nearly 6.3 million cars and trucks in the U. S. (not including 290,000 built in Canada) last year may be off 10 to 12 per cent, but the total for 1950 may still be a whopping 5.6 million units. Auto activity will be high for the first half of 1950, but less lively in the second. Estimated output of trucks, at 1.1 million in 1949, may decline to 1 million. In autos the theme for the year will be price. Look for less expensive models.

Construction—Construction, as well as automobiles, was one of the mainstays of the economy in 1949 and is likely to remain so in 1950. About $19,250 million worth of new construction was put in place in the past 12 months. This will remain about the same or drop to 5 per cent less in the next 12. A slight increase in demand is expected. But there may be a small decrease in the dollar volume because of price dips anticipated in the latter part of the year.

Structural fabricators are reasonably optimistic about 1950. The question is whether the contract tonnage will reach the postwar peak of more than 1,965,000 tons in 1948, but most everyone thinks business for 1950 will hold at least at around the 1.5 million tons estimated for last year. Should it no more than



The President and fact-finders

JULY— Coal miners resume work July 5 without new contract . . . Ford acquires 100-acre site at Hamburg, N. Y., for $35 million auto stamping and subassembly plant . . . Final settlement of labor dispute delayed 60 days by President's decision to appoint fact-finding board outside of Taft-Hartley act. He names David L. Cole, Samuel I. Rosenman, and Carroll R. Daugherty, July 15. Nineteen producers agree to recognize board before July 16 strike deadline . . . UAW presses demands for early settlement with Ford before fact-finders' report . . . Unemployment study by Commerce Department starts in New England; announcement is made of "spot assistance" program to place government contracts in economically depressed areas . . . Fact-finders start hearings in New York, July 26 . . . USA-CIO officials sign non-Communist affidavits, complying with T-H, July 27.

surpass last year's volume, it would still be comparable with the average of the five prewar years, 1936-1940.

While private construction normally far exceeds public work, there was a lessening in the gap last year. This trend will probably continue through 1950. A heavy amount of bridge and road work is in prospect all over the country. Hospital and school construction and institutional work will probably increase more.

Private building may continue to decline. With immediate postwar expansion about completed, another skid in industrial construction is likely. Construction for privately owned public utilities has been outstanding in the industrial field, but this program is tapering off. Gas is the only exception.

Steel plant construction, another active program, should be off this year. It may have reached a new postwar peak in 1949. Early estimates for last year place steel plant expenditures at $627 million, against $583 million in 1948, $496 million in 1947, $291 million in 1946 and $148 million in 1945. Over the next decade the steel industry development will be more on the technological side.

Except for commercial building, which may increase slightly, work on most types of nonresidential building may decline. This includes churches, social and recreational facilities. Home building, which reached an alltime record of 1 million units in 1949, will slip, but it will still be good.

Containers—In the time that it takes you to read this sentence (6 seconds), about 23,000 metal cans could be turned out by the container industry. About 28 billion cans were made last year. This production may be at least equalled in 1950, and there's a chance of a slight increase because of metal's competitive advantage over glass. Cost of moving a metal can is about one-eighth that of moving glass. Despite frozen foods, much of which is packed in paper, the average family is now eating about 20 or 30 per cent more canned fruits and vegetables than before the war. Consumption of beer in cans is increasing, and more insecticides and chemicals come in cans now than in 1939.

Nearly all government restrictions on use of tin plate in containers were withdrawn Dec. 1. Removal of the restrictions will have little effect on total tin plate production, but tin coatings may be a trifle heavier next year.

Electrolytic tin plate production passed that of hot dipped for the first time in 1949. In 1941, American Iron and Steel Institute figures did not even show electrolytic tin plate production, although several lines were installed before the war. In 1949 an estimated 2 million tons were turned out by the electrolytic process, compared with 1.8 million tons made by the hot dip method.

Railroad Equipment—Although carbuilding against old orders was active last year, railroads did little new buying. They will buy less in 1950. This is the one segment in metalworking which is in poor shape. Railroads took 8 per cent of the steel produced in 1948, about 7 per cent in 1949. The downward trend will continue in 1950.

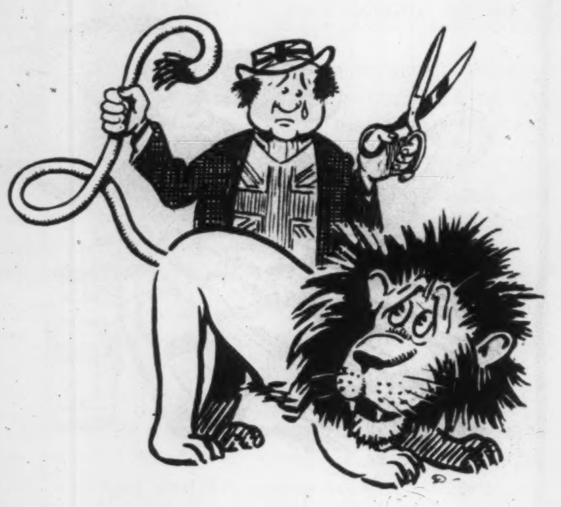
Auto output: All time high

AUGUST— Armco making plans for a $12 million steelmaking plant at Middletown, O. . . . Economic pendulum on upswing . . . Kaiser Steel Corp. and Basalt Rock Co. make manufacturer's agreement: Basalt will add facilities to produce large diameter electric fusion weld pipe, Aug. 8 . . . Barium Steel Corp. buys Phoenix Iron Co. and Phoenix Bridge Co. from Kaiser-Frazer, Aug. 19 . . . Industry spokesmen tell fact-finding board that the board's method of handling labor disputes may mean end of collective bargaining . . . European industrial activity edges upward despite financial and diplomatic crises brought about by Britain's economic position . . . Steel companies tell fact-finders that the industry cannot absorb increases asked by the union. There is no assurance that either side will accept the fact-finding board's recommendations. STEEL sees prospect of a long strike, Aug. 29. Board's hearings end Aug. 30.

Railroad buying in 1950 will be best for diesel locomotives. There will be a fair volume of repair work. Everything else will be poor. Passenger car buying has about stopped altogether. One survey of buying plans shows that freight car purchases by 69 roads in 1950 will total only $33 million, about a third of what was spent in 1940 and the lowest amount since 1935.

Railroad equipment makers are alarmed at the rising cost of rail freight in this country. They fear their customers, the railroads, are fighting a losing battle with trucks and other means of transportation.

Freight rates now are in the same relation to the other economic costs as they were in the early 1800s. At that time the high price of transportation hamstrung the nation. The country had its great advance industrially after the Civil War because rail-



Britain devalues pound sterling

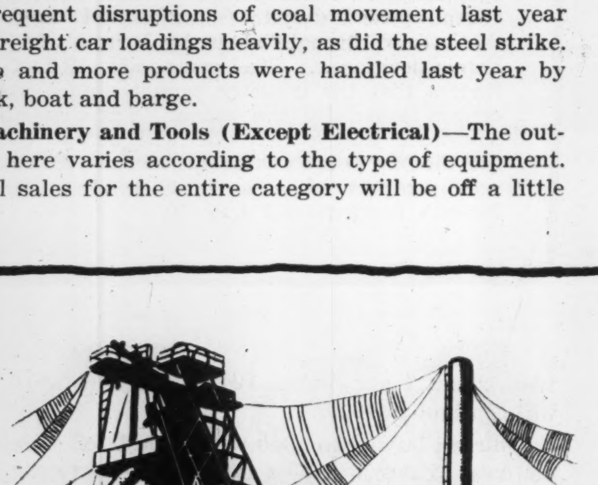
SEPTEMBER— ICC approves 3.7 per cent increase in rail and water freight rates on permanent basis, Sept. 1. Combined with Jan. 11 interim advance, it is an average of about 9 per cent for the year. Freight rate advances since warend amount to 57.3 per cent average . . . Railroads go on 40-hour week, Sept. 1 . . . On Sept. 10 President announces steel fact-finding board's recommendations: No wage increases, but employer-financed insurance and pension programs. Board suggests programs should cost 4 and 6 cents an hour; details to be worked out through bargaining . . . Weirton Steel Co. puts huge open hearth, more than three times normal size, in operation . . . President asks for ten-day extension (Sept. 10) and five-day extension (Sept. 21) of strike deadline . . . Ford grants $100 pensions, Sept. 29 . . . Britain devalues pound from $4.03 to $2.80 Sept. 19 . . . Voluntary allocations end Sept. 30.

roads came into their own and for a time cheapened freight. What may come is a new, cheap means of transportation. Perhaps several new media will come in at about the same time—air trains, long conveyor belts or tremendous pipe lines through which can be pumped products like powdered metals and coal.

Frequent disruptions of coal movement last year hit freight car loadings heavily, as did the steel strike. More and more products were handled last year by truck, boat and barge.

Machinery and Tools (Except Electrical)—The outlook here varies according to the type of equipment. Total sales for the entire category will be off a little from 1949. ECA authorizations for machinery are declining. Foreign competition, especially from Britain, will be a powerful factor in 1950 even in the domestic market. Exports, aside from ECA business, will be poor. Dismantled machinery from Western Germany may hit U. S. sales abroad in 1950. Hard-pressed for funds, European industrialists will buy the cheap, relatively modern Ruhr equipment.

Machinery men had an indifferent time in 1949, despite the increasing need for industry to cut costs. Some economists think the machinery and tool business will be mediocre for at least the next two years. Of course, this is all relative; the makers of this



Steelworkers strike

OCTOBER— Nation-wide steel strike starts Oct. 1 . . . A. O. Smith Corp. and Sheffield Steel Co. organize A. O. Smith Corp. of Texas to build $5 million pipe mill in Houston, Oct. 3 . . . ICC approves reduction of iron and steel freight rates in West . . . USA-CIO workers walk out of Alcoa plants, Oct. 17 . . . Senate agrees to postpone action until Jan. 20, 1950, on Senate-House version of O'Mahoney pricing bill, Oct. 18 . . . President signs minimum wage bill, Oct. 24, raising wages from 40 cents to 75 cents per hour effective Jan. 24, 1950 . . . Lone Star Steel Co. announces plans to build $52 million steel mill for eastern Texas, Oct. 29 . . . Bethlehem Steel Co. signs insurance-pension pact with United Steelworkers, Oct. 31 . . . ICC approves request of southern carriers to reduce freight rates on iron and steel shipments from Birmingham, Oct. 31 . . . Centripetal casting announced.

equipment are still doing better than before the war.

The five basic machinery lines whose prospects appear the best are: Materials handling equipment, such as fork trucks and power conveyors; combustion and fuel economy equipment, such as boilers, oil burners and gas burners; process equipment, such as modernization units for oil refineries and chemical plants; gas and oil pipeline equipment, such as compressors and pumps; and large gas and diesel engines.

Machine tool orders are spotty. Engineering firms in the Pittsburgh, Philadelphia and Boston areas are doing more buying now than they have for a year.

July was the worst month last year for the machinery and tool people, but things have been a trifle better since. Surprisingly few orders in the Military Aid Program have been placed. A large volume is expected here between now and Mar. 1. The Atomic Energy Commission also has unallotted funds which will go for machinery and tools.

Electrical Machinery—Certain types—broadcasting and television equipment—will have a better year in 1950 than in 1949. Orders will decline for utility items, but production will be about the same as in 1949 because it takes a lot of time to make such items as power generating equipment. Last year the industry's dollar value of production was nearly four times prewar totals, but it was off slightly from the 1948 volume.

Utilities are expected to have a "wait and see" attitude this year. In the long-term this is an expanding industry. The electrical energy consumed per unit of production continues to rise.

The high level of new construction expected for 1950 should bolster demand for electrical building supplies. Sales volume in this classification may hit $700 million for the year. About one-third of this goes into commercial and residential buildings.

Sales volume of fans increased 10 to 15 per cent last year. A similar improvement in demand was noted for electrostatic air cleaning equipment for commercial and industrial applications. A moderate drop in sales of air conditioning apparatus occurred in 1949. Expect further improvement in sales volume of air cleaning units in 1950. Bookings for other items should match the 1949 volume with the exception of heavy duty fans where a small decline is expected.

Look for well sustained demand for standard and industrial control apparatus throughout 1950. Output last year exceeded the 1948 volume slightly. Further improvement is indicated this year.

Output of electric motors and generators slipped 15 to 20 per cent in 1949 compared with 1948. Sharpest declines came in small units. But the general situation improved in the 1949 third quarter after prices had been cut. The momentum of the upswing should continue into 1950. In this category, 1950 production may top the 1949 level by 5 to 10 per cent.

Household Appliances—You can get them "wholesale" in 1950. Sales will drop 5 to 10 per cent this year over the 1949 level. Supplies will be adequate and requirements reduced. The trend will be away from deluxe models because of price considerations. The industry will have a tough fight on its hands in competition with the auto and other consumer industries for the mass market dollar.

Appliance makers expect to do a roaring business for the first quarter of 1950, but things will slough off a little from there on. Many manufacturers have design improvements on their drawing boards which they will spring to spur the market in the second half of the year.

Farm Equipment—Farm income and equipment buying may be down 10 to 15 per cent in 1950. This forecast may go completely topsy-turvy if the government shifts its gears on the farm price support program.

The expense of price props is growing by leaps and bounds, and the government this year might try to ease its loads.

The short-term outlook is not too bad for farm equipment people because farmers are going to cut spending on household items first, not on their production equipment.

The equipment buying squeeze is going to hit the small manufacturers. The seven large makers out of the 1500 producers in this industry account for 65 per cent of the total output. Total sales of some of

Pensions granted

NOVEMBER— Basic steel producers follow Bethlehem "formula" in signing with USA-CIO . . . Hand sheet facilities at Apollo, Pa., resume operations under name of Whitney-Apollo Corp., Nov. 1 . . . CIO's drive against Communists results in ousting of leftist United Electrical Workers, Nov. 3 . . . UMW ends 52-day coal strike, Nov. 10 . . . Consolidated Western Steel Corp. announces Nov. 21 a change in location of proposed large diameter electric weld pipe mill from Houston to Orange, Tex. . . . Detroit Steel Corp.'s stockholders approve purchase of Portsmouth Steel Corp., Portsmouth, O., Nov. 28 . . . Granite City Steel Co., Granite City, Ill., shuts down its last hand sheet mill, marking end of 15-year, $20 million expansion and modernization program . . . Some small steel producers raise prices.

Prognosis: Recovery

DECEMBER—Proposed "consent decree" settlement of steel basing point pricing case submitted to FTC for approval, Dec .1. . . . Commission in deadlock over it . . . Coal miners strike again. John L. Lewis announces intention of renewing three-day work-week starting Dec. 5 for hard and soft coal miners . . . Most restrictions on use of tin plate for cans and closures eliminated . . . Steelmaking rate bounds back . . . Survey shows 80 per cent of companies queried by American Society of Tool Engineers will buy as much or more capital equipment in 1950 as they did in 1948 . . . Government legislative experts compounding antidepression prescriptions for next session of Congress . . . John L. Lewis finally reveals miners' demands six months after negotiations: 15-cent hike in tonnage royalty and 95-cent daily wage increase . . . United States Steel Corp. increases steel prices, Dec. 16 . . . Great Lakes' carriers successfully complete 1949 ore shipping season despite steel and ore mine strikes.

these lagged only slightly behind 1948, to make last year the second best in history for them. Many small makers may hang on by consolidating their distributor organizations, as one group did last year.

Unduly coloring opinions on 1950 prospects could be an overemphasis of the importance of the "red" market which developed last year. For a short time many types and makes of equipment could be obtained at less than list or even cost prices. Industry spokesmen agree that this was a passing condition caused by poor guesses as to the actual condition of farm demand. Dealers and some manufacturers got panicky. All this was washed out by the steel strike which hit many small makers so they couldn't produce anyway.

The industry fears that currency devaluations will throttle its foreign sales.

Oil and Gas Equipment—Prospects for this classification are about the same as they were for 1949. The industry's sales could go 2 per cent either way of last year's volume. Gas and oil well drilling will fall about 5 per cent in 1950. Some of this will be offset by modifications and expansions in refinery equipment. Over-stocked with heavy grades of oil last year, many refiners—particularly in California—are modifying their equipment to refine lighter grades of oil that are in better demand. Total oil field equipment and refinery needs should fall slightly, but gas equipment demand should rise.

Gas pipelines are sprouting like weeds all over the country as demand for this handy fuel mounts. The steel industry expects production of line pipe to continue at capacity throughout the year.

Mining, Quarrying and Lumbering—These industries may be off slightly in 1950. The coal industry is the most important part of this segment. While logically it should push mechanization to the limit to counteract the tactics of John L. Lewis, coal companies simply don't have enough money to spend.

Less coal may be mined in 1950 than in 1949. The switch from coal to other fuels will be even more pronounced. Coal-burning locomotives are becoming more and more scarce. Utilities are switching to oil or gas, at least as alternate fuels. Coal is losing out as a home heating fuel, but it still is the most widely used domestic heat source.

Shipbuilding—Look for a 10 per cent increase in activity here. Even so, this remains a minor segment of the metalworking picture. There will be increased repair work and possibly a little new building. American shipyards are at a sharp competitive disadvantage with foreign yards on a cost basis and are operating at a low rate. An aid to the industry is the government stipulation that part of Marshall Plan shipping go in American bottoms.

A spurt in tanker construction helped the industry in 1948 and 1949, but this program is about over. Political and security pressure may bring some new awards this year.

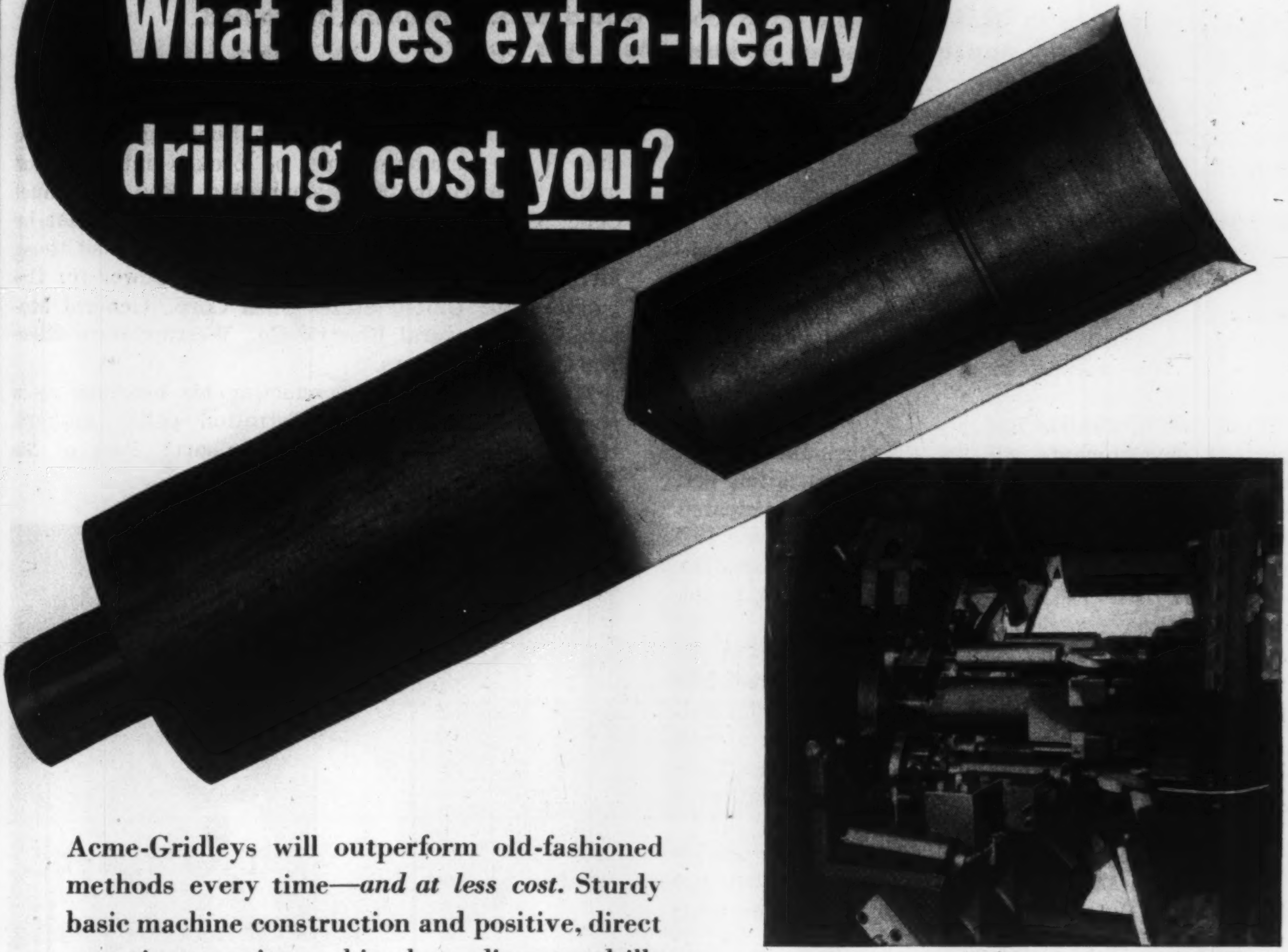
Aircraft—A 10 per cent gain is expected in this industry over 1949 levels. But the boost will be entirely in military ordering. Commercial airlines are having a rough passage. They will do a minimum of new ordering.

Although small, this industry offers a profitable market for parts suppliers because of the special, precision components required.

Military and Ordnance—This may increase 20 per cent, but anything can happen here. World political developments dictate the trend.

Exports—Total U. S. exports will be down 15 to 20 per cent this year from the 1949 level. The reasons: Devaluation, more intense foreign competition and decline in ECA appropriations.

What does extra-heavy drilling cost you?



Acme-Gridleys will outperform old-fashioned methods every time—*and at less cost.* Sturdy basic machine construction and positive, direct camming permits pushing large diameter drills at heavy feeds while holding close concentricity—the .002 limit on the job illustrated is typical.

Unless your present machining methods can match this performance, you owe it to yourself to investigate what modern Acme-Gridley Automatics can do for *your* cost figures. May we give you more information? Ask for new bulletin T.P.-44, showing Top Performance on 44 jobs.

JOB FACTS

PART: Steel Shaft
SIZE: 10" x 2⅜" Diam.
MATERIAL: B 1112 Steel Bar Stock
MACHINE: Acme - Gridley 2⅝" RB-4 Spindle Automatic Bar Machine
OPERATIONS: 12
TOLERANCE: .002 Concentricity on All Machined Diameters
MACHINING TIME: 1 Minute, 30 Seconds

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Thread Rolling Machines Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Counters • Solenoids Centrifuges • Contract Manufacturing

Windows of Washington

By E. C. KREUTZBERG
Washington Editor, STEEL

The administration is formulating a lot of policies that will affect business in 1950. Some are good. Some would be bad medicine if adopted. It will pay businessmen to keep their eyes open

BUSINESSMEN will become even more aware of Washington in 1950. A large amount of permanent business legislation is on the fire. The administration is formulating many policies that will affect the metalworking industry directly or indirectly.

Some proposals to be acted on in 1950 are sound; some would be bad medine if adopted. Businessmen will want to watch developments closely and be prepared to speak out forcefully, either pro or con, when the time comes. In most cases this will occur early in the year.

Congress to Control Budget—One of the year's important developments will be the formulation and adoption of a single consolidated appropriation act, with expenditures fixed in the light of anticipated income. Congress for the first time will assume full responsibility for fiscal policy. If it votes another deficit for fiscal 1951, it cannot pass the buck to the administration.

Sen. Harry F. Byrd (Dem., Va.) will fight to cut the fiscal 1951 budget to $36 billion, $7.5 billion less than for 1950. He is the watchdog of the budget.

It must not be forgotten that 1950 will be a very important election year in which such issues as Taft-Hartley repeal and the Brannan farm support plan will be submitted to the voters.

Shorter Session—Because of this the 1950 session will be much shorter than that of 1949. When the Senate and House return to their chambers—completely rebuilt and refurnished— Jan. 3, the leadership quickly will lay out a schedule to permit adjournment no later than July. Congressmen want to get back home to start campaigning. Here are the 1950 legislative prospects:

Taxes—Revision of laws onerous to business has been promised by the House Ways & Means Committee. Repeal or reduction of many excise taxes is promised. The committee definitely will consider action on proposals to eliminate or modify so-called "double taxation" on corporate earnings—i.e. on profits and again on dividends. It will consider shortening the period over which new equipment purchases may be amortized—possibly to 5 years. It will consider various proposals to relieve small business; the most important calls for application of the 38 per cent combined normal and surtax to earnings of between $25,000 and $50,000 which now are taxed 53 per cent.

Chances for adoption of such proposals are considered as "good." Tax leaders in Congress have become convinced that changes in the present tax structure are needed to enable industry to attract more risk capital, and to retain more of its earnings for purposes of working capital and expansion.

Monopolies — The Celler monopoly subcommittee, House Judiciary Committee, will report early in January a proposal to designate some agency, probably the Federal Trade Commission, to investigate large corporations and start actions against those that in its opinion should be broken into smaller units. The committee's sparkplug, Rep. Emanuel Celler (Dem., N. Y.), makes no bones about what he has in mind. Time and again he has mentioned these interests as having too much economic power for the public good: United States Steel Corp., General Motors Corp., General Electric Co., Westinghouse Electric Corp., and others.

Mr. Celler has been conducting his hearings as a sounding board for administration policy makers. His proposals will have wide support: Part of his program already has been approved by the House in the form of the so-called antimerger bill and has a good chance of Senate endorsement.

SEN. HARRY F. BYRD

. . . *watchdog of the budget*

This antimerger bill started out as a measure to close a loophole in the Clayton Act. Right now FTC may act against mergers only when they are effected through the purchase of stock. The original antimerger bill was intended to give FTC power to proceed against mergers achieved through purchase of assets of a competing interest. The bill came from the House with a vicious added feature that would permit FTC to block the sale of a business to a competitor. Heretofore when a business man wanted to sell out—when he was nearing the retirement age, or when his estate had to be made liquid for tax purposes—his best sales prospect has been a competitor. If this bill, now awaiting Senate action, goes through in its present form, it will narrow the market for the disposal of going businesses; many

Want to
CUT COSTS?

See
EX-CELL-O

XLD
EX-CELL-O for PRECISION

EX-CELL-O Special Machine Combines Operations to Save Handling... Save Man Hours... Save Space

This Ex-Cell-O Special Machine for turning the tapered ellipse on automotive pistons does a complicated machining job while still maintaining a high rate of production and fine finish. Ex-Cell-O used as a basis for this operation a standard Style 61 Precision Cylinder Boring Machine. Production is 180 pieces per hour net. The engineering "know-how" that makes a job like this possible is available to you through Ex-Cell-O. Write Ex-Cell-O in Detroit today!

49-8

EX-CELL-O CORPORATION DETROIT 32

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

small businessmen will be forced to sacrifice assets which they have been building over a lifetime.

Despite the life-or-death threat involved, few business men opposed the bill in Congress.

Freight Absorption—The House-passed O'Mahoney measure defining the legal right to absorb freight and quote delivered prices to meet competition is scheduled for final Senate action Jan. 20. Key man is Sen. Paul H. Douglas (Dem., Ill.) who contends that the present wording would strip the government of all jurisdiction over pricing methods. He has a large following, so Senate approval of the bill in its present form is not expected. Outlook indicates the outcome may be the adoption of a new bill to be presented by Mr. Douglas, or by Senator O'Mahoney, or jointly by both, which would express the right to absorb freight in more precise language.

REP. EMANUEL CELLER
. . . sparkplug of the monopoly subcommittee

Lobbies—The coming activities of the House Special Committee to Investigate Lobbying will be concerned primarily with illegal or improper lobbying by government agencies, and with private lobbyists not registered. If you maintain lobbying activities, and are properly entered in the Lobby Register in the office of the clerk of the House, you have nothing to fear from this investigation. Chairman of the special committee is Rep. Frank Buchanan (Dem., Pa.)

Patents—In January the Senate Judiciary Subcommittee on Patents, Trademarks & Copyrights will launch hearings on S. 2518. That measure was introduced by Sen. Alexander Wiley (Rep., Wis.) at the request of the Milwaukee Patent Law Association. It is intended to prevent or reduce the need for patent litigation. It would give the patent commissioner final determination as to what constitutes novelty. It provides that the patent itself constitutes and determines the scope of the invention covered, and that a claim based on functionality covers all functional structures or acts. It defines infringement, and identifies arguments which may not be used to defend infringement. Progress of the measure should be watched to guard against the insertion of jokers.

Shipbuilding—The Bland bill to stimulate shipbuilding is before the House after long study and should be approved at least by that chamber in 1950. It would apply the construction-differential subsidy, now granted only on new vessels operated with subsidy assistance in designated trade routes, to all new vessels built for United States foreign commerce. Liability of the buyer of a vessel would be limited to a first mortgage on the vessel, and there could be no attempt to collect against the operator's other assets. Purchasers would also receive benefits in the form of special tax treatment. The bill would pave the way for consumption of more steel for shipbuilding and for a big increase in the business of metalworking companies that manufacture machinery and other equipment for ships. The bill provides government assistance for modernizing Great Lakes and St. Lawrence river and gulf vessels.

Synthetic Fuel—Proposals to extend government assistance to private firms that are interested in the establishment of synthetic fuel industries are before the Senate Committee on Interior and Insular Affairs and the House Committee on Interstate & Foreign Commerce. They call for large loans, at low interest, for maturity over 30 years. They contemplate construction of three or four commercial plants, each with capacity to produce 50,000 barrels of synthetic fuel daily. To build and equip such plants large tonnages of steel and vast quantities of machinery and equipment would be needed.

Other Legislative Proposals—Other business legislative possibilities that will at least be considered in 1950 are implementation of the Point Four program, authorization of membership in the International Trade Organization, House action on the Senate-passed National Science Foundation bill, Senate action on the House-passed Social Security Expansion bill, creation of a Columbia Basin Authority, guarantee of dollar payments on exports to western hemisphere countries, mine incentive payments, St. Lawrence seaway, labor-education-extension-service for the Labor Department—and, of course, the national health program and the several civil rights measures. Ready to be pulled out of pigeonholes, if the need arises, are a number of so-called antidepression measures.

Forthcoming administration actions of special interest to business in 1950 are:

A report by the National Advisory Committee for Aeronautics for formulating a national aviation policy.

Renewal of reciprocal trade treaties with many nations. Lower rates on many commodities are contemplated. Due to widespread complaints over threats to many domestic industries, the State Department's Trade Agreements Committee proposes to discuss contemplated tariff reductions with industry advisory committees still to be appointed.

Decisions by FTC in various cases, especially on whether or not to accept the proposal to settle the steel pricing case by recognizing the right of steel mills to absorb freight to meet competition.

By **A. H. ALLEN** *Detroit Editor, STEEL*

Mirrors of Motordom

As halfway mark of the 20th century approaches, motordom sets its sights even higher. Prospects for the first half of 1950 are excellent. Even if output falls behind 1949, 1950 may be one of the best years

WHEN General Motors' president C. E. Wilson about a year ago predicted the automotive industry would build something like 6 million cars and trucks in 1949 there were few who took him seriously. Now it appears his forecast was on the low side, and output will come to approximately 6,565,000 despite a loss of nearly 400,000 in November and December because of the steel and coal strikes. The total includes Canadian output of 290,000, of which 102,000 were trucks. Of the U. S. total, 1,135,000 were trucks, representing 18 per cent of total production. The proportion of truck assemblies to total output has been declining since 1945, although it still comprises a substantial volume. In 1946, trucks were 30 per cent of the total, in 1947 they were 26 per cent, and in 1948 the same.

Motordom's Big Year—Other new records were set last year on motor industry payrolls, number of vehicles in use, motor travel mileage and special motor vehicle tax totals. Wholesale value of the year's output was about $8 billion, or $1.3 billion above 1948. Replacement parts production, however, dropped $500 million from the record $2.5 billion registered in 1948.

Vehicle registrations also set a new peak last year: 35.7 million cars, 8 million trucks and over 200,000 motor buses were in operation. That's over 2.7 million more vehicles than were in use the previous year and over 9 million more than in 1941 when the nation had 29.6 million cars in use, along with 5.1 million trucks and 126,000 buses.

Average employment in automotive manufacturing plants approximated 780,000; 650,000 of these were production employees earning $2.3 billion in wages—9 per cent more than the previous year. Motor vehicle owners paid nearly $3.7 billion in special taxes throughout the year. They paid $3.4 billion in 1948, less than $2.1 billion in 1941 and only $849 million in 1929. Taxes included $1230 million in federal excises, $1450 million in state gasoline tariffs, $810 million in state license fees and about $195 million in special local taxes assessed against motor vehicles. Trucks alone paid almost one-third of total special taxes.

Sights Set Even Higher—As the half-way mark of

FLAT POLISHING STEEL: In Pontiac's pressed steel department sheets are started through a series of six vertical belt polishers. After washing, they are coated with a water soluble compound and "cured" in an oven. The pieces, after washing and plating, are formed without scratching. All polishing afterwards is eliminated and important economies are realized

the twentieth century approaches, the sights of the motor industry are being set on ever-higher production goals. But it is difficult to see how the record production pace of the past year can be maintained much longer. Still, prospects for the first half of the year point to a rate equal to the best realized last year and perhaps a little better. At least General Motors, Chrysler and Ford are planning such schedules; whether or not the independent manufacturers will keep pace remains to be seen.

When the figures are tallied next December it is considered likely the motor industry will find production has fallen behind the 1949 level by approximately 10 to 12 per cent. That would still make 1950 one of the best years in the industry's history, with assemblies totaling close to 5,845,000 cars and trucks, U. S. and Canada. Whether this ambitious planning will be realized or not depends to a considerable degree on the strength of the retail market in the second half of the year.

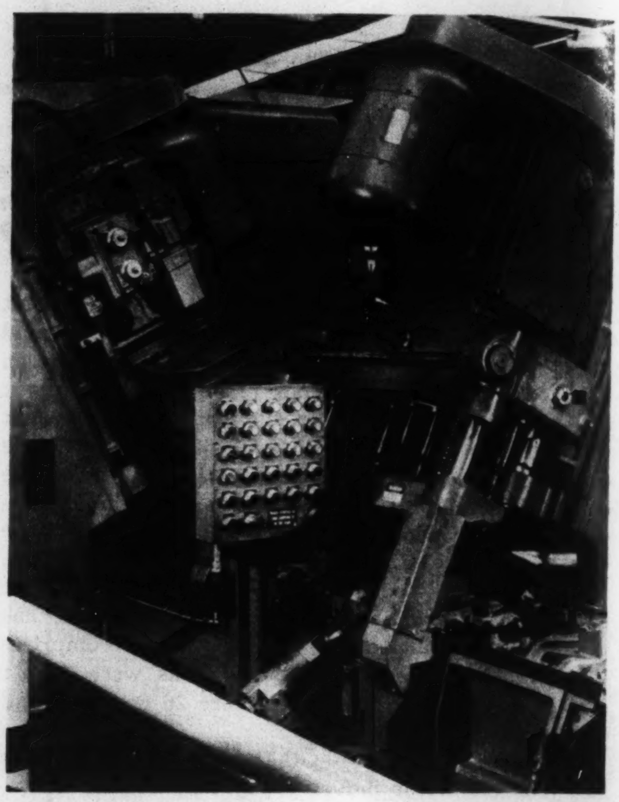
Some industry officials feel they have been underestimating U. S. capacity to "consume" motor vehicles. Surveys by the Federal Reserve Board and the Commerce Department seem to bear them out: A check has shown that out of each $100 spent by the American people on consumer goods, $6.20 goes for automobiles and parts. That is about two-thirds as much as they spent on shoes and clothing and represents the largest automotive outlay in the country's history. In prewar 1939, automobiles and parts accounted for only $3.10 of each $100 consumer spending; clothing and shoes took $10.40, compared with only $9.90 today.

There are estimated to be on the road today 14.5 million cars that are more than ten years old, 7.5 million more than 12 years old. This conjures up a replacement demand alone that sales experts place at 3 million to 3.5 million cars and 600,000 to 800,000 trucks a year over the next five years. Add to this new owners of 1 million to 1.5 million cars and 300,000 to 400,000 trucks and you have a total replacement and first purchase demand for 5 million to 6 million cars and trucks a year over the next five years. These figures, of course, count on a continuation of good business conditions; come an economic setback and they would have to be revised appreciably.

More on the Credit Side of the Ledger—Another factor on the plus side is the growth in multiple-car ownership. It is estimated today that as many as 3 million families own more than one car; there was somewhat less than half that number at the end of the war. There is every reason to assume multiple-car ownership will continue to grow with the increase in per capita national income and further broadening of its distribution. Government figures attest the fact: Total personal holdings of liquid assets more than tripled in the eight-year period from 1941 to 1949. The median family income increased more than 100 per cent, although automobile prices jumped only 80 per cent. Even allowing for the difference in value of the dollar between 1941 and the present, personal savings will allow buying of twice as much as in 1940.

Big Market in High Income Groups—Of the 20 million prewar model family cars in use last year, more than 6.6 million were owned by families with incomes of more than $4000 a year. Families at that income level are considered good prospects for new car purchases. Better than 3.6 million of these prewar cars were being operated by families with annual incomes of $5000 or more. Actually, 60 per cent of the cars owned by families in this group, were prewar models, and 37 per cent of the cars owned by families earning more than $7500 a year were of prewar vintage. Thus, in all but the highest of income groups which are normally considered new car buyers, a majority of the cars owned were prewar models. Another interesting fact is that about 1.2 million of the postwar models in operation at the time of the FRB survey were owned by families whose incomes were less than $3000 a year. Whether the percentage of new car ownership by this income group will continue to remain that high is doubtful, but the figures suggest that income is not always a true indication of intent to buy.

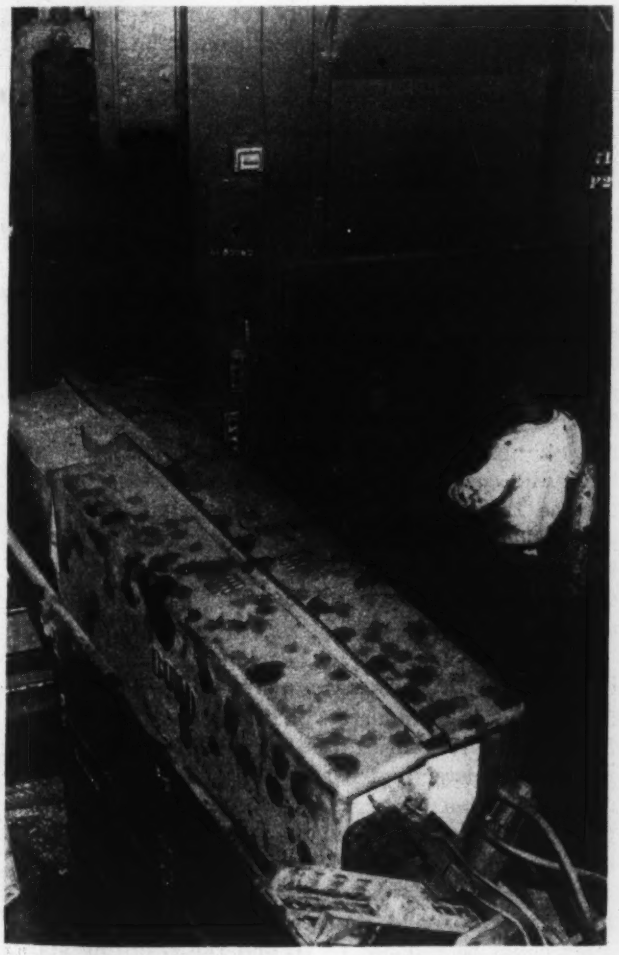
Price consciousness is becoming more important among car buyers. The result is: Models of the standard rather than deluxe variety are being featured. By stripping off a little molding here and there, removing some of the deluxe accessories and otherwise providing plainer rather than ornate transportation, it is believed more buyers can be attracted. Standard models can be sold at $75 to $100 less than



PUSHBUTTON CONTROL: Transfer-type machine tools are appearing in greater numbers throughout motordom—particularly in engine and transmission manufacture. Here is the start of a line at Oldsmobile for drilling and reaming intake manifold castings. Individual stations, and the entire line are easily controlled from the pushbutton panel in the foreground deluxe types. They are the ones receiving the principal sales impetus.

Higher Manufacturing Costs—With the inflationary effect of pensions already an established fact, higher manufacturing costs apparently will be unavoidable. There is little doubt the auto industry will agree to pension plans of the type instituted by Ford last year. To that burden will be added the cost of such pensions throughout the materials and parts industries. Whether they can be absorbed without further increasing car and truck prices is the $64 question. It probably will be answered this year. From present indications it seems that they will have to be absorbed; the only way to do it is through manufacturing economies.

Cost Cutting Consciousness—Cost-cutting has come to be the No. 1 project of the automotive industry, and all the best talents and resources of thousands of suppliers have been enlisted. To show what has been accomplished, STEEL asked all the principal manufacturers to furnish some details. A few were reticent: They thought there was no point to telling their competition how they were saving. Others readily supplied facts and figures. Here are some important ones:



IMPROVING PROPERTIES, LOWERING COST: Square billet enters a heavy three-stage ring gear press at Ford's Canton, O., forging plant. Heating is accomplished in the automatically controlled induction heater (left, foreground). Extensive use is made of isothermal salt bath annealing of forgings as they come from the presses. Costs are lowered, properties improved

In Oldsmobile's handsome new assembly plant at Lansing cars are transferred automatically sidewise from one "leg" of the assembly line to another. After a car has been transferred, it goes backward to the end of that leg; then it is transferred sidewise to another leg on which it proceeds forward. Work can be performed on cars with equal ease whether they are moving forward or backward.

Ingenious use is made of automatic machinery in the fabrication of gasoline tanks at the Olds plant. The tanks are soldered by electric induction equipment; six men can produce 100 per hour. An automatic selector picks out the type of tanks intended for shipment to different assembly plants.

Escalator for Olds' Employees—Another showpiece at the Olds plant is an escalator that carries workmen between the first and second floors. Similar in construction and appearance to department store units, the twin escalators travel upward at lunch periods, making it more convenient to reach the second-floor cafeteria.

Prepolishing of steel in the flat for parts which are to be plated has been instituted by several of the motor companies—Pontiac, Oldsmobile and Briggs Mfg. Co. to mention three.

Substantial Economies at Buick—For production of Buick front fenders a new method of preforming the steel blank and welding before the draw operations has brought substantial economies. In the process, the blank is folded to form an irregular cone; then it is welded from the headlamp area to the catwalk flange on the grille side. The welded cone next goes through the draw dies. The cone nests into the draw die so it isn't necessary to draw as deep as in the former method, thus equalizing the draw. The new method also eliminates blemishes and wrinkles occurring in deep-draw operations and does away with redraw steps as well as washing and annealing and later cleaning after the draw, as previously required.

In the fabrication of brake bands for Buick's Dynaflow transmissions, important cost savings have been realized by a new welding procedure. Formerly, a bar of steel 9/16-in. thick was hot rolled into a ring, welded by the submerged-arc process and finally machined. In the rough it weighed 6 lb. and when finished 1½ lb. Now a piece of steel the exact width desired is cold rolled into a ring and the "ear" area projection welded and hydrogen-brazed to the ring, the rough weight now being 1¾ lbs., and boring, milling and heat treating operations eliminated.

Willys-Overland has been studying materials handling operations closely to perefect economies. If the use of heavy and expensive steel and wood pallets, containers and racks could be eliminated in the shipment of materials from vendors, savings could be realized. So engineers developed a new technique called "palletless palletization." It consists of piling and banding parts into unit loads without dunnage in such a manner that they can be shipped by the vendor and received and handled by fork truck.

Statistical Quality Control at Willys—Introduction of statistical quality control methods at Willys has contributed to the reduction of scrap and rework in many applications. During the past year pilot installations of these techniques were made in scattered operations and the results were so encouraging that they were followed by additional installations.

An important feature of quality control at Willys is a training program to acquaint the whole organization with the purpose and possible results of the effort. The training includes giving all production supervisors at least 50 hours' instruction in the work.

Ford Saves on Voltage Regulator—Ford has effected annual savings of $337,483 by replacing a two-piece base in a voltage regulator with a one-piece design, permitting the use of standardized components. Further saving of $193,536 was effected by changing a method of machining shackle pins. A four-spindle automatic screw machine, with secondary operations on the four additional stations, was installed for the job. An old-style broach was replaced by a new multiple-loading continuous type. A multiple-spindle drill was used to drill the hole, and a lead pot heat treating furnace was replaced by a controlled-atmosphere gas furnace.

K-F Saves on Materials Handling—Kaiser-Frazer has realized a saving of 35 per cent in materials handling overhead, chiefly through palletizing. At present the company is palletizing about 30 per cent of the 4000-odd parts handled: Radiators, coil and leaf springs, air cleaners, filters, mufflers, brakes, hubs and drums, rear axles, transmissions, bumpers, hub caps, floor mats, batteries, generators, starters, lights, windshield wipers and various stampings. About 80 per cent of the palletizing is done on K-F's own docks. Vendors are being encouraged to undertake a larger proportion of the work. In some cases palletizing by the vendor adds to the original unit cost, but that's more than offset by reductions in manpower handling hours at the Willow Run plant.

Leave the Lights On

THERE are few cost angles not receiving concentrated attention in all companies. One manufacturer reports installation of automatic shut-offs for cooling water on welding machines has brought significant savings. The same company made a careful study of fluorescent lighting equipment and found that no savings were possible by turning off the tubes for less than one-hour's time. The tubes deteriorated more rapidly with frequent turn-offs. That more than offset the power savings realized.

Packard's Cost Committee—Packard has set up a cost committee. Its function is to study existing costs and to survey all engineering alterations and revisions to see that only those items are approved which can be justified as consumer requirements.

The committee reviews all savings or increases in costs and outlines cost problems to be assigned to subcommittees for further study. Here's an example: Problems where cost of designs are involved are assigned to an engineering group. It in turn calls on purchasing or manufacturing representatives which include process men, tool engineers and labor and material estimators. All the subcommittees refer their findings to the main cost committee for review and approval.

There's another group that seeks ways and means of getting production workers to perform more work with less effort on the individual parts they handle. Example: In assembling the copper washer to a valve tappet cover stud, production recently was increased from 915 to 2343 pieces per hour by a thorough analysis and motion study of the operation.

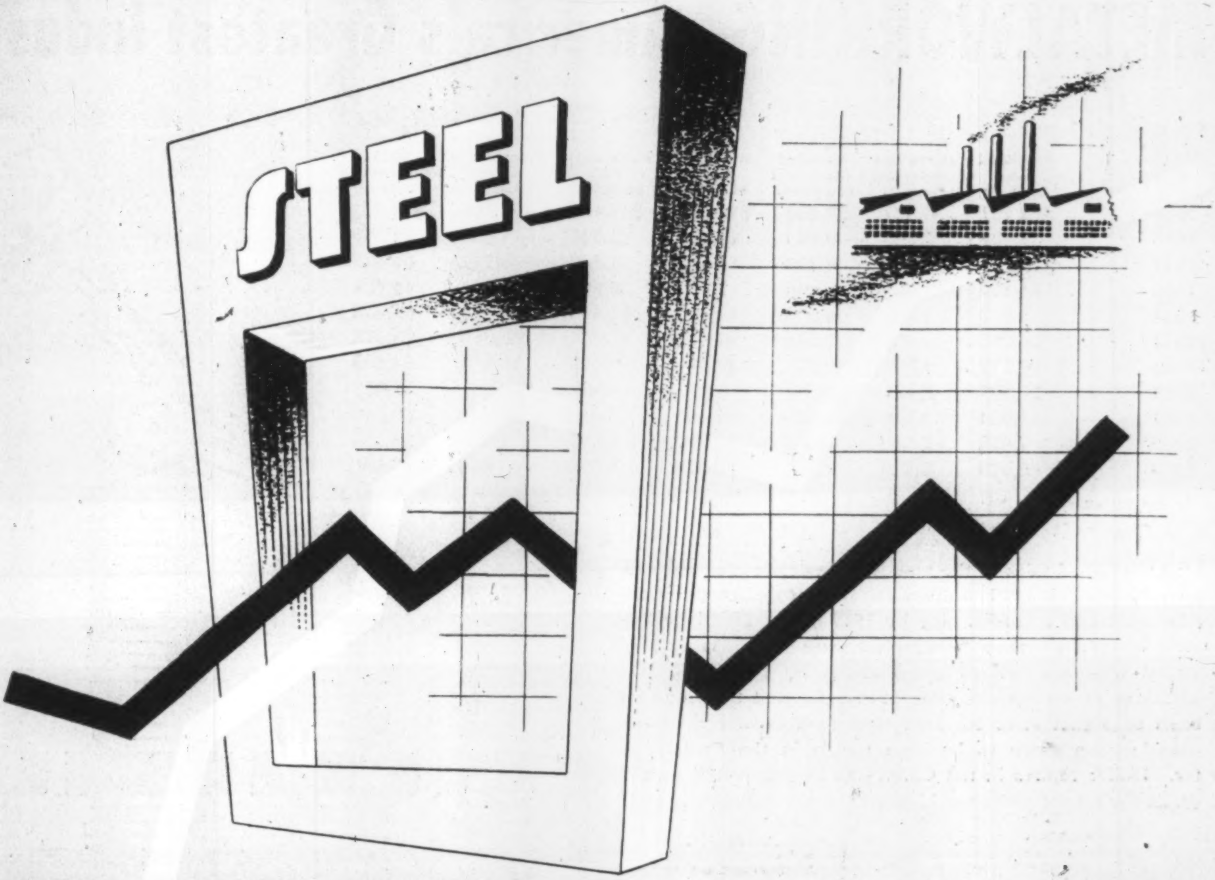
Pontiac Follows Buick Lead—A front fender forming technique like that started at Buick is showing cost savings in Pontiac's press plant. Basic feature is the preliminary shaping of the nose section in the blank before placing it in the draw die. The blank is notched, and extreme ends of the notch are brought together in a special machine to form a conical shape. A vertical ram completes the nosing. Then a seam welding roll is traversed upward, guided by a track to weld the joint securely and accurately.

A double-action press performs the single drawing operation with a relatively simple set of dies and at a high rate of speed. Unique angle of the process is elimination of the necessity for any deep drawing of the nose section. The draw being relatively shallow, there is corresponding reduction in blankholder pressure, minimizing the amount of stock formerly required under the blankholder. Part of the nose section itself is used for the blankholder area without marring or other damage because of the relatively low pressure involved.

A Leader in the Standardization Field—Standardization of materials, parts, equipment and tools has been a continuing process in the automotive industry for many years. Since the war the pace has been stepped up because of the economies that have been realized. General Motors has been a leader in the field. For the past several years it has worked with machine tool builders to standardize electrical and hydraulic controls. So important did those projects become that other companies were invited by GM's production engineering section to participate. Out of this grew what was called a Joint Industry Conference (JIC) that drew up formal electrical and hydraulic standards.

Detailed standards were developed for die sets that eventually proved to cover about 85 per cent of the general needs of industry. These suggested the need for further standardization of mounting dimensions for press bolster plates and rams. A survey of GM divisions, other large users of press equipment and the specifications listed in the catalogs of press builders showed better than 750 different sizes of presses.

As the study progressed under the JIC arrangement, it was found that the large number of press sizes could be reduced to 76 and the resulting standards applied to all future purchases. Advantages will include: Lower inventory, fewer sizes and better interchangeability of dies, better workmanship resulting from increased usage of the same sizes, inspection greatly facilitated, and simplification effected in the service and maintenance phases.



METALWORKING

Facts and Figures

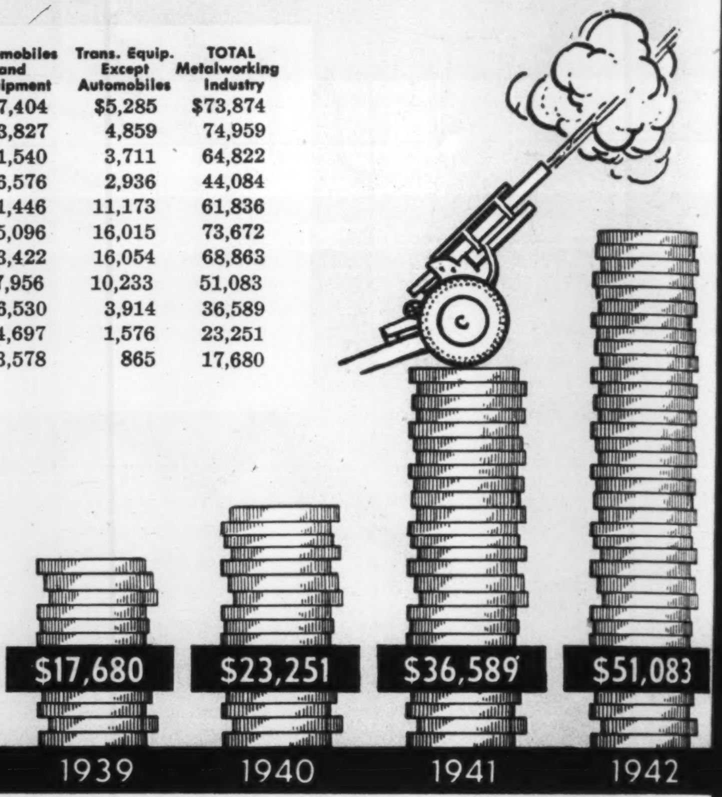
IN this special 32-page section you will find selected statistics you will want to keep handy for ready reference. The facts and figures were compiled by the editors of STEEL, by trade associations, by government departments and by private research organizations. The statistics—heretofore published in widely scattered reports and publications—are brought together for the first time to meet a difficult problem facing the metalworking executive: Where to find significant data as and when needed. This section is a refinement and at the same time an expansion of "Statistics for the Metalworking Industries" appearing in STEEL's Jan. 3, 1949 annual. For current statistics and business weather information, refer to the Business Trend section in STEEL every Monday.

METALWORKING—America's Greatest Industry

MILLIONS OF DOLLARS	Iron-Steel and Products	Nonferrous Metal and Products	Electrical Mach. and Equipment	Machinery Except Electrical	Automobiles and Equipment	Trans. Equip. Except Automobiles	TOTAL Metalworking Industry
1949*	$22,157	$6,337	$8,680	$14,011	$17,404	$5,285	$73,874
1948	24,134	7,368	9,493	15,278	13,827	4,859	74,959
1947	20,615	6,639	8,772	13,545	11,540	3,711	64,822
1946	14,170	4,889	5,698	9,815	6,576	2,936	44,084
1945	16,812	4,463	6,302	11,640	11,446	11,173	61,836
1944	17,795	4,755	7,104	12,907	15,096	16,015	73,672
1943	16,772	4,595	5,734	12,286	13,422	16,054	68,863
1942	14,563	3,411	4,550	10,370	7,956	10,233	51,083
1941	11,921	3,065	3,769	7,390	6,530	3,914	36,589
1940	7,678	2,120	2,483	4,697	4,697	1,576	23,251
1939	6,079	1,726	1,861	3,571	3,578	865	17,680

* Estimated.

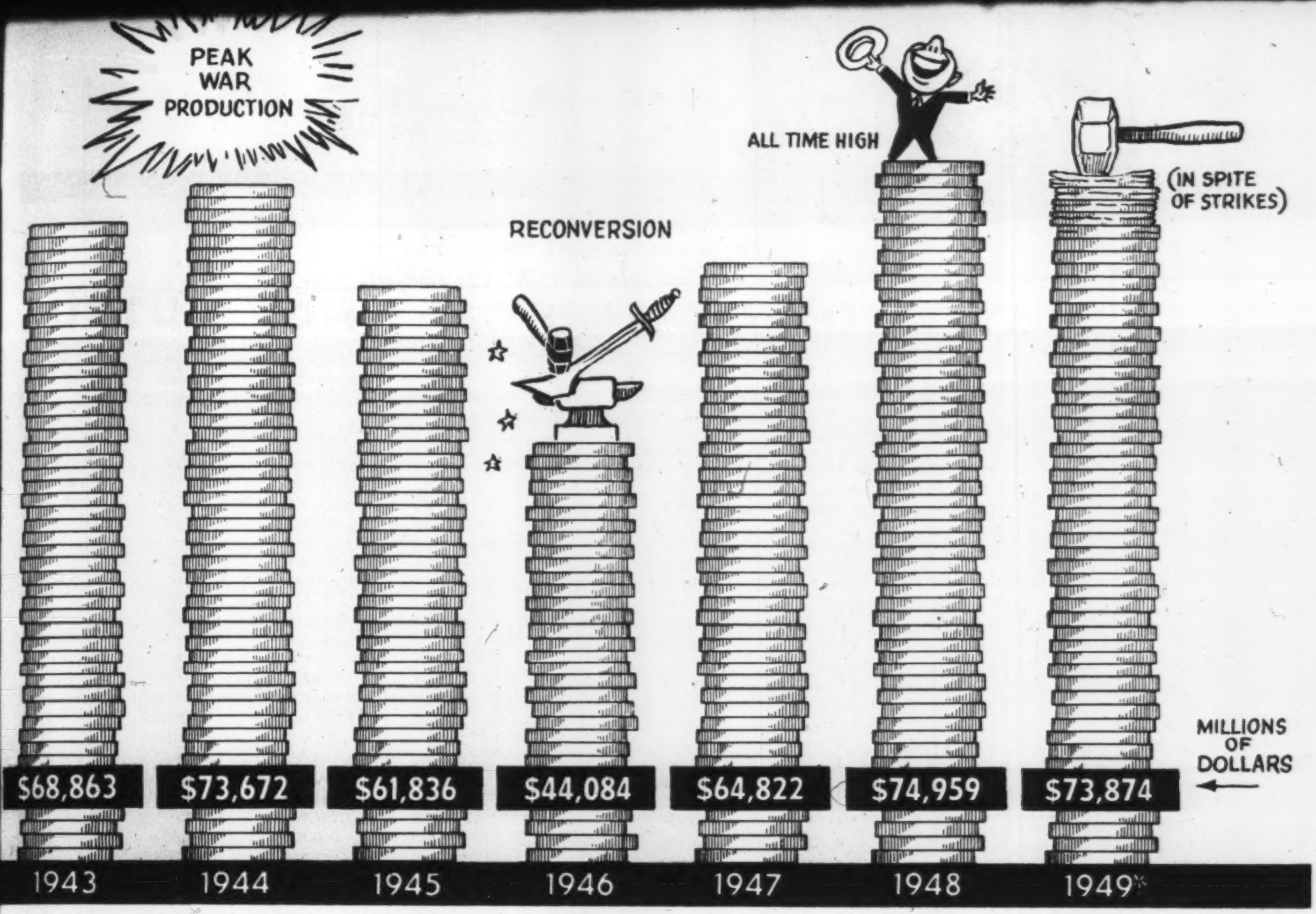
Manufacturers' sales in the metalworking industries reached an estimated $73,874 million in 1949, topping the wartime peak and exceeded only by 1948 sales. Metalworking sales have more than quadrupled since 1939. Data presented here are revised compilations by the U. S. Department of Commerce, with 1949 estimated by STEEL on basis of actual sales for first nine months and with due consideration given to business trends in the final quarter. Dollar figures in the Commerce Department's revised series for recent years are higher than the earlier series.



INDEX

TO FACTS AND FIGURES

Aircraft Shipments 142
Alloy Steel:
  Production 128
  Shipments 129
Aluminum:
  Castings 138
  Prices 135
  Production 138
  Wrought Products 138
Antimony:
  Consumption 137
  Imports 137
  Prices 135
  Production 137
Appliances, Household 140,141
Automobile Production 142
Barrels and Drums 147
Batteries Shipped 142
Bauxite:
  Imports 138
  Production 138
Bicycles Shipped 142
Boilers, Radiators, Convectors, Shipments of 145
Brass:
  Fabricator Statistics 136
  Ingot, Shipments 136
  Prices 135
Bronze Prices 135
Building Cost Index, Industrial 154
Bus Production, U. S. 142
Business Failures and Liabilities 151
Business Incorporations, New .151
Businesses Discontinued 151
Businesses in Operation 151
Cadmium Prices 135
Cans, Metal 147
Carbon Steel Shipments 129
Carloadings, Freight 151
Castings:
  Aluminum 138
  Copper 136
  Gray Iron 128
  Lead, Die 137
  Magnesium 138
  Malleable Iron 128
  Steel 128
  Zinc 137
Census of Manufactures .146,147
Coal, Bituminous Output 153
Coal Chemicals, Prices 134
Cobalt Prices 135
Coke Price Averages 132
Coke Production 153
Conduit, Rigid, Steel and Fittings 146
Construction Valuation 154
Consumers' Price Index 131
Containers and Closures 147
Copper:
  Castings 136
  Exports 136
  Fabricator Statistics 136
  Imports 136
  Prices 135
  Production 136
  Shipments 136
  Stocks 136
Cost of Living Index 131
Debt, U. S. 152
Dividends, Corporate 152
Durable Goods Industries, New Orders 150
Durable Goods Production Index 131
Earthmoving, Excavating Equipment Shipments 144
Electric Industrial Furnaces 146
Electricity Output 153
Employment:
  Metalworking 149
  Steel Industry 148
  Total U. S. 148
Expenditures, U. S. 152
Exports, U. S. 150
Fabricated Structural Steel .. 154
Farm Machinery and Equipment Shipments 144
Federal Reserve Board Indexes:
  Durable Goods Production .131
  Industrial Production 131
  Iron and Steel Production .131
  Nondurable Goods Production 131
  Nonferrous Metals and Products Output 131
Finance
Finished Steel:
  Annual Price Averages
  Arithmetical Price Composite
  Distribution
  Weighted Price Composite
Fluorspar:
  Consumption
  Imports
  Production
  Stocks
Forgings, Steel
Foundry Equipment:
  Orders
  Shipments
Freight Carloadings
Freight Cars:
  Awards
  Shipments
Fuel Oil Consumption in Steel Industry
Fuel, Power, Raw Materials
Furnaces:
  Industrial Electric
  Warm Air
Gear Sales Index
Generators, Electric
Gray Iron Castings
Gross National Product
Heating Appliances, Electric
Hours Worked:
  Metalworking Production
  Steel Industry
Houses Started, New
Imports, U. S.
Income, Corporate
Income, National
Industrial Production Index



nventories, Manufacturing and
Durable Goods Industries . . 150
ridium Prices 135
ron Ore:
Consumption 153
Price Averages 132
Stocks 153
ron and Steel:
Exports, Imports 150
New Orders 150
Price Composites and
Averages 132,133
Production Index 131
roners, Standard Size 140
rons, Flat, Electric 140
egs, Steel 147
itchen Cabinets, Steel 140
ead:
Castings, Die 137
Consumption, U. S. 137
Prices 135
Production 137
comotive Order Backlogs . . 143
achine Tools:
Order Indexes 144
Shipments 144
achinery, New Orders 150
achinery and
Equipment 144,145
agnesium:
Castings 138
Wrought Products 138
alleable Iron Castings 128
anganese:
Domestic Mine Production . 139
Exports, Imports 139
olybdenum Production 139
otor Vehicles 142
otors, Electric 146
ickel Prices 135
ickel Silver Prices 135

Nondurable Goods Production
Index 131
Nonferrous Metals:
New Orders 150
Prices 135
Production . 136, 137, 138, 139
Nonferrous Metals and Products Output Index 131
Oil Burners, Shipments 145
Packages, Steel 147
Pails, Steel 147
Passenger Cars:
Automotive, Production . . . 142
Railroad, Shipments 143
Payrolls, Steel Industry 148
Phosphor Bronze Prices 135
Pig Iron:
Capacity, U. S. 127
Production, U. S. 127
Pig Iron and Ferroalloys, World
Output 126
Pig Iron Price Composites . . 133
Plant and Equipment Expenditures, New 154
Platinum Prices 135
Plumbing Fixtures, Shipments . 140
Price Composites and Averages, Iron and Steel . 132, 133
Prices, Iron and Steel, Average Monthly:
Chicago 134
Eastern Pennsylvania 134
Pittsburgh 134
Pumps, New Orders 145
Purchasing Power of the Dollar 152
Radio Receivers 140
Railroad Equipment 143
Ranges, Gas, Electric 141
Refrigerators, Electric 141
Revenues, U. S. 152

Rigid Steel Conduit 146
Roasters and Broilers, Electric 141
Sales, Manufacturing and Durable Goods Industries . . . 150
Scrap, Iron and Steel:
Consumption, Stocks 153
Exports, Imports 150
Price Composite 133
Screw Machine Products Industry, Shipments 146
Ship Construction, Merchant . 143
Shipbuilders Finished Steel
Consumption, U. S. 143
Shipbuilding, Naval 143
Silver:
Prices 135
Production 139
Stainless Steel:
Production 128
Shipments 129
Steel:
Alloy, Production 128
Alloy, Shipments 129
Capacity 127
Carbon, Shipments 129
Castings, Shipments 128
Conduit, Rigid 146
Finished Distribution 129
Forgings, Shipments 128
Prices 132, 133, 134
Production 127
Production for Sale 130
Stainless, Production 128
Stokers, Mechanical, Sales . . . 145
Stoves, Heating, Domestic . . . 141
Structural Steel, Fabricated . . 154
Taxes, Corporate 152
Television Receivers 140

Tin:
Consumption 139
Imports, U. S. 139
Prices 135
Production, World 139
Smelter Output, U. S. 139
Stockpile, RFC 139
Stocks 139
Tractors, Shipments 144
Trade and Business . . . 150, 151
Transit Equipment Delivered . 142
Transportation 142, 143
Transportation, New Orders . . 150
Trucks, Automotive 142
Trucks and Tractors, Electric Industrial 144
Truck Trailers 142
Tungsten Production 139
Unit Heaters, New Orders . . . 145
Vacuum Cleaners, Standard . . 141
Wages:
Common Labor, Steel 149
Metalworking Production . . 149
Steel Industry 148
Washers, Domestic 141
Water Heaters:
Electric 141
Gas 140
Welding Electrodes, Shipments 145
Wholesale Price Indexes:
All Commodity 131
Manufactured Products . . . 131
Work Stoppages 149
World Pig Iron Production . . . 126
World Steel Production 126
Zinc:
Castings 137
Mine Production 137
Prices 135
Slab, Production 137

World Production

METALWORKING FACTS AND FIGURES

By Countries—Net Tons

STEEL INGOT AND CASTINGS OUTPUT

	1949a	1948	1947	1946	1945	1944	1943	1942
World Total	167,431,000	167,356,400	147,200,111	120,881,060	120,583,828	163,586,576	174,888,688	167,849,275
United States	77,600,000	88,640,470	84,894,071	66,602,724	79,701,648	89,641,600	88,836,512	86,031,931
Canada	3,350,000	3,198,720	2,945,936	2,334,640	2,877,952	3,016,160	3,004,176	3,109,904
Great Britain	17,360,000	16,662,240	14,250,880	14,218,736	13,244,000	13,599,264	14,594,720	14,494,704
France (b)	9,900,000	7,972,970	6,317,766	4,858,000	1,831,200	3,407,600	5,650,400	4,944,800
Saar	1,935,000	1,346,644	780,216	Included in Germany				
Belgium	4,300,000	4,316,534	3,179,270	2,517,200	812,000	685,440	1,841,280	1,518,720
Luxemburg	2,615,000	2,704,308	1,887,726	1,426,096	291,200	1,398,544	2,379,440	1,729,168
Italy	2,235,000	2,341,750	1,874,502	1,270,640	436,800	1,130,752	1,903,328	2,131,360
Spain	710,000	625,936	596,182	660,800	616,000	700,000	728,000	660,800
Sweden	1,495,000	1,384,320	1,312,482	1,324,624	1,316,000	1,316,000	1,344,000	1,355,200
Germany (c)	10,450,000	6,323,276	3,490,034	3,318,448	1,705,984	20,187,888	22,877,008	22,570,576
Austria	880,000	714,096	394,516	206,080	189,504	1,116,416	1,160,992	988,736
Czechoslovakia	3,200,000	2,920,300	2,519,172	1,842,624	1,047,200	2,802,576	2,770,656	2,570,064
Poland	2,250,000	2,071,760	1,740,058	1,344,000	545,552	2,149,056	2,689,120	2,304,736
Hungary	800,000	771,400	662,302	392,000	141,904	573,888	855,680	864,528
Russia (a)	20,000,000	18,183,000	14,300,000	13,440,000	10,080,000	8,960,000	8,960,000	8,960,000
Japan (d)	3,000,000	1,895,040	1,070,042	700,000	1,173,700	8,099,168	10,061,968	8,704,192
India	1,500,000	1,350,000	1,389,732	1,457,120	1,515,136	1,533,168	1,570,464	1,504,496
Australia	1,100,000	1,424,640	1,511,328	1,124,144	1,573,600	1,784,048	1,912,064	1,903,776
So. Africa	715,000	658,996	658,896	555,184	588,448	533,008	460,880	381,584
Brazil	578,000	508,000	426,900	378,015	226,530	241,235	202,758	175,576
Mexico	395,000	295,000	353,100	276,100	211,200	199,320	194,040	104,280
Miscellaneous	1,063,000	1,047,000	645,000	633,885	458,270	511,445	891,202	840,144

(a) Estimated.
(b) Without Alsace Lorraine until 1945.
(c) All occupied zones of Germany proper since September 1945, but without Saar from 1947.
(d) Including Korea and Manchuria until July 1945.

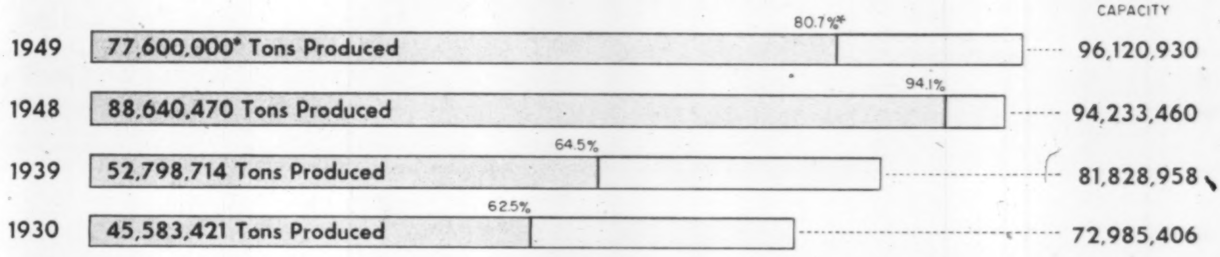
PIG IRON AND FERROALLOYS OUTPUT

	1949a	1948	1947	1946	1945	1944	1943	1942
World Total	123,445,000	123,237,277	107,664,844	85,225,946	85,219,845	118,256,582	125,768,379	119,037,800
United States	54,000,000	61,911,559	60,117,319	46,514,826	54,919,029	62,866,198	62,769,947	60,903,304
Canada	2,535,000	2,365,440	2,190,048	1,520,736	1,956,080	2,023,952	1,955,408	2,184,000
Great Britain	10,600,000	10,389,120	8,719,200	8,692,544	7,960,288	7,544,880	8,049,328	8,652,672
France (b)	9,200,000	7,245,650	5,384,372	3,857,280	1,303,680	3,188,640	5,423,040	4,229,680
Saar	1,720,000	1,249,668	719,606	Included in Germany				
Belgium	4,000,000	4,355,186	3,107,640	2,392,656	803,040	779,520	1,800,960	1,397,760
Luxemburg	2,650,000	2,894,954	2,003,436	1,504,384	350,560	1,485,568	2.499,504	1,304,688
Italy	500,000	573,040	425,372	192,864	87,360	336,784	709,744	1,078,112
Spain	680,000	584,060	554,306	540,960	516,320	604,800	660,800	604,800
Sweden	950,000	860,160	800,052	750,400	862,400	952,000	884,800	845,600
Germany (c)	8,200,000	5,336,986	2,640,392	2,707,824	1,237,600	15,835,792	17,602,368	16,897,104
Austria	970,000	679,934	306,356	63,840	110,208	1,061,312	1,115,520	907,872
Czechoslovakia	2,000,000	1,829,320	1,568,146	1,058,400	635,040	1,724,800	1,850,352	1,736,896
Poland	1,300,000	1,212,200	957,638	800,800	268,800	1,206,800	1,288,336	1,243,200
Hungary	435,000	396,720	339,416	175,840	48,160	230,720	460,096	460,096
Russia (a)	17,000,000	15,428,000	12,500,000	10,080,000	8,400,000	7,840,000	6,720,000	4,480,000
Japan (d)	1,700,000	903,640	409,940	203,840	1,400,000	6,192,592	6,850,816	7,444,528
India	1,600,000	1,450,000	1,553,269	1,584,912	1,554,000	1,616,384	1,970,752	2,073,008
Australia	990,000	1,384,320	1,280,384	978,656	1,298,640	1,462,048	1,611,904	1,296,512
So. Africa	790,000	712,320	707,952	597,184	612,640	519,792	536,704	401,968
Brazil	578,000	508,200	426,827	378,015	226,530	241,235	202,758	175,576
Miscellaneous	1,047,000	966,800	953,173	629,985	669,470	542,765	805,242	720,424

Production-Capacity

METALWORKING FACTS AND FIGURES

Steel Ingots and Steel for Castings—Net Tons



ANNUAL STEEL CAPACITY AND PRODUCTION BY PROCESSES

	Open-hearth		Bessemer		Crucible		Electric		TOTAL		Per Cent
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity
1949.....	84,817,040	....	5,191,000	....	20	‡	6,112,870	....	96,120,930	77,600,000*	80.7*
1948.....	83,610,690	79,340,157	5,226,000	4,243,172	20	‡	5,396,750	5,057,141	94,233,460	88,640,470	94.1
1947.....	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	91,241,250	84,894,071	93.0
1946.....	81,236,250	60,711,963	5,154,000	3,327,737	20	‡	5,500,290	2,563,024	91,890,560	66,602,724	72.5
1945.....	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	95,505,280	79,701,648	83.5
1944.....	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	93,652,290	89,641,600	95.5
1943.....	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	90,292,660	88,836,512	98.1
1942.....	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	88,569,970	86,031,931	96.8
1941.....	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,869,256	84,152,292	82,839,259	97.3
1940.....	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,882,630	1,700,006	81,619,496	66,982,686	82.1
1939.....	72,959,638	48,409,800	7,138,880	3,358,916	5,354	931	1,725,086	1,029,067	81,828,958	52,798,714	64.5
1938.....	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	80,185,638	31,751,990	39.6
1937.....	69,725,736	51,824,979	7,084,000	3,863,918	11,850	1,046	1,326,788	947,002	78,148,374	56,636,945	72.5
1936.....	68,946,829	48,760,463	8,058,400	3,873,472	11,850	914	1,147,221	865,150	78,164,300	53,499,999	68.4
1935.....	68,544,310	34,401,280	8,842,400	3,175,235	11,850	719	1,053,370	606,471	78,451,930	38,183,705	48.7
1934.....	68,222,445	26,354,838	8,842,400	2,421,840	18,704	595	1,044,867	404,651	78,128,416	29,181,924	37.4
1933.....	68,241,286	22,827,473	8,872,668	2,720,246	23,684	763	1,476,765	471,747	78,614,403	26,020,229	33.1
1932.....	68,176,102	13,336,210	9,072,420	1,715,925	24,725	722	1,507,666	270,044	78,780,913	15,322,901	19.5
1931.....	66,642,430	25,210,714	9,080,820	5,386,259	30,891	1,733	1,503,662	460,255	77,257,803	29,058,961	37.6
1930.....	61,884,894	39,255,073	9,608,407	5,639,714	33,523	2,523	1,458,582	686,111	72,985,406	45,583,421	62.5

---

* Estimated by STEEL. ‡ Included with electric steel. American Iron & Steel Institute.

MONTHLY OUTPUT OF STEEL FOR INGOTS AND CASTINGS

	Open-hearth		Bessemer		Electric		Total		Calculated Net Tons Weekly	No. weeks in mo.
	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.		
1949 ..	....	....	......	...	....	...	77,600,000*	80.7*	1,488,300*	52.14
Jan. ..	7,287,683	101.1	408,552	92.6	487,260	93.8	8,183,495	100.2	1,847,290	4.43
Feb. ..	6,633,779	102.0	379,698	95.3	467,247	99.6	7,480,724	101.4	1,870,181	4.00
Mar. .	7,473,901	103.7	430,176	97.5	483,850	93.2	8,387,927	102.7	1,893,437	4.43
Apr. ..	7,015,611	100.5	404,095	94.6	365.570	72.7	7,785,276	98.4	1,814,750	4.29
May ..	6,889,230	95.6	400,741	90.9	299,751	57.7	7,589,722	92.9	1,713,256	4.43
June .	5,954,619	85.3	349,196	81.8	194,386	38.6	6,498,201	82.2	1,514,732	4.29
July ..	5,307,471	73.8	300,236	68.2	171,415	33.1	5,779,122	70.9	1,307,494	4.42
Aug. ..	6,101,499	84.7	355,335	80.6	257,910	49.7	6,714,744	82.2	1,515,744	4.43
Sept. .	5,992,306	86.1	350,282	82.2	247,601	49.3	6,590,189	83.5	1,539,764	4.28
Oct. ..	814,374	11.3	......	...	111,708	21.5	926,082	11.3	209,048	4.43
Nov. ..	3,754,982	53.8	172,270	40.3	218,042	43.4	4,145,294	52.4	966,269	4.29
1948 ..	79,340,157	94.9	4,243,172	81.2	5,057,141	93.7	88,640,470	94.1	1,695,495	52.28
Jan. ..	6,770,831	95.6	343,263	77.5	366,784	80.2	7,480,878	93.7	1,688,686	4.43
Feb. ..	6,247,491	94.4	340,689	82.3	359,837	84.2	6,948,017	93.1	1,678,265	4.14
Mar. .	6,845,777	96.6	363,334	82.0	409,659	89.6	7,618,770	95.4	1,719,813	4.43
Apr. ..	5,640,273	82.2	185,140	43.2	399,074	90.1	6,224,487	80.5	1,450,929	4.29
May ..	6,801,633	96.0	355,659	80.3	423,350	92.6	7,580,642	94.9	1,711,206	4.43
June ..	6,484,114	94.5	356,907	83.2	424,228	95.8	7,265,249	94.0	1,693,531	4.29
July ..	6,348,611	89.8	325,080	73.6	401,826	88.1	7,075,517	88.8	1,600,796	4.42
Aug. ..	6,633,443	93.6	371,306	83.8	442,085	96.7	7,446,834	93.3	1,681,001	4.43
Sept. .	6,594,499	96.3	387,259	90.5	443,086	100.3	7,424,844	96.2	1,734,777	4.28
Oct. ..	7,120,753	100.5	409,657	92.5	466,485	102.0	7,996,895	100.1	1,805,168	4.43
Nov. ..	6,925,043	100.9	411,161	95.9	461,354	104.2	7,797,558	100.8	1,817,613	4.29
Dec. ..	6,927,689	98.0	393,717	89.1	459,373	100.7	7,780,779	97.7	1,760,357	4.42

---

* Estimated.

PIG IRON

PRODUCTION and CAPACITY

Net Tons

	Capacity	Production	%
1949	70,541,850	54,000,000*	76.6*
January		5,724,839	95.5
February		5,223,409	96.5
March		5,820,161	97.1
April		5,530,730	95.3
May		5,516,606	92.0
June		4,818,918	83.0
July		4,173,311	69.8
August		4,476,917	74.7
September		4,351,155	75.1
October		611,591	10.2
November		....	...
December		....	...
1948	67,438,930	61,043,806	90.5
1947	65,709,200	59,314,348	90.3
1946	67,340,590	45,547,907	67.6
1945	67,313,890	54,166,482	80.5
1944	67,921,410	62,072,683	91.4
1943	64,188,220	61,920,314	96.5
1942	60,606,850	60,115,387	99.2
1941	57,774,640	56,070,506	97.1
1940	55,723,640	46,979,091	84.3
1939	56,325,830	35,396,478	62.8
1938	56,782,208	21,182,569	37.3
1937	55,557,305	41,171,187	74.1
1936	55,854,280	34,476,170	61.7
1935	57,097,870	23,703,915	41.5
1934	57,243,268	17,927,789	31.3

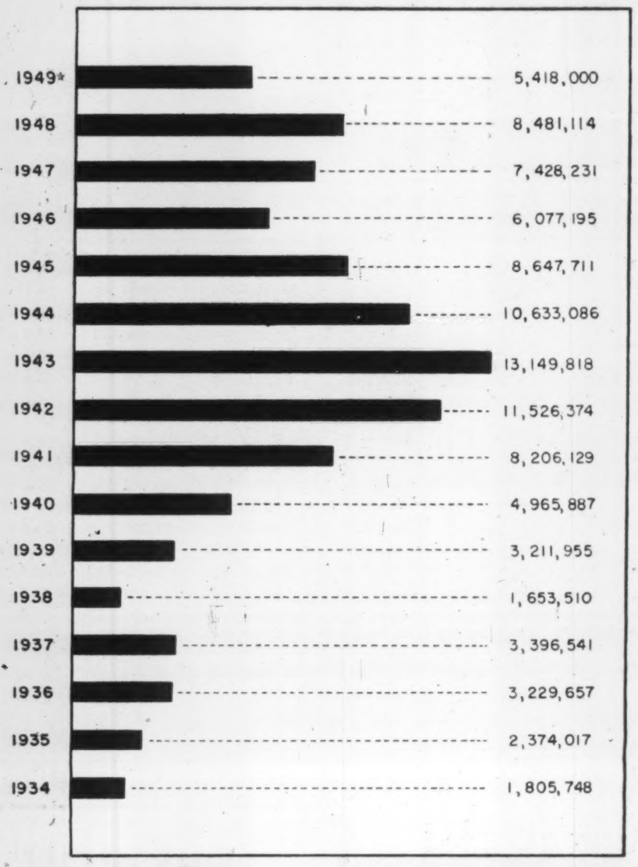
---

* Estimated by STEEL.
American Iron & Steel Institute.

Ferrous Production

ALLOY STEEL PRODUCTION

Total Ingots and Castings—Net Tons



ALLOY STEEL PRODUCTION BY PROCESSES

Ingots and Castings—Net Tons

	Open-hearth					
	Basic	Acid	Total	Bessemer	Crucible	Electric
1949‡ .	....	......	3,629,555	....	†	1,299,337
1948 ..	6,285,054	128,915	6,413,969	....	†	2,067,145
1947 ..	5,520,540	128,754	5,649,294	....	†	1,778,937
1946 ..	4,325,657	115,711	4,441,368	....	†	1,635,827
1945 ..	5,572,353	274,889	5,847,242	....	18	2,800,451
1944 ..	6,494,627	515,662	7,010,289	....	23	3,622,774
1943 ..	8,539,523	677,416	9,216,939	....	136	3,932,743
1942 ..	7,524,209	608,867	8,133,076	....	522	3,392,776
1941 ..	5,306,415	433,240	5,739,655	3,890	933	2,461,651
1940 ..	3,421,961	252,965	3,674,926	3,990	255	1,286,716
1939 ..	2,302,273	156,581	2,458,854	3,486	231	749,384
1938 ..	1,179,031	102,089	1,281,120	13	5	372,372
1937 ..	2,559,200	164,455	2,723,655	....	270	672,616
1936 ..	2,508,671	129,658	2,638,329	....	234	591,094
1935 ..	1,829,566	82,208	1,911,774	....	172	462,071
1934 ..	1,431,744	38,685	1,470,429	60	115	335,144

‡ First ten months.

† Included with electric steel.

American Iron & Steel Institute.

* Estimated.

Stainless Steel Production

Net Tons of Ingots

Type Number	1948	1947	Type Number	1948	1947
301	61,565	24,485	414	5,562	2,090
302	145,426	124,542	416	16,264	9,905
302B	1,523	629	420	4,852	4,818
303	14,633	9,171	430	122,437	105,783
304	100,966	115,367	430F	1,526	1,098
308	2,947	2,564	431	1,120	1,476
309	4,902	4,137	440A	1,433	800
310	5,663	3,849	440B	218	125
316	28,622	29,630	440C	1,220	1,223
321	7,528	6,949	442	318	439
347	33,346	22,966	443	33	13
403	6,423	5,921	446	2,573	1,753
405	4,126	2,259	All Other .	13,958	16,531
406	2,580	1,842			
410	25,614	19,568	Total ..	617,378	519,933

American Iron & Steel Institute

Steel Castings

Shipments for Sale—Net Tons

	1949	1948	1947	Yearly Totals	
Jan. ...	103,503	108,282	101,140	1947	1,203,504
Feb. ...	99,425	107,762	92,822	1946	1,047,857
Mar. ...	102,027	125,550	99,701	1945	1,490,202
Apr. ...	83,277	114,896	106,127	1944	1,843,386
May ...	75,537	111,616	103,779	1943	1,928,645
June ...	84,112	117,794	103,888	1942	1,679,178
July ...	50,124	87,927	85,014	1941	1,316,027
Aug. ...	59,412	107,538	88,719	1940	797,947
Sept. ...	55,853	112,551	102,913	1939	594,147
Oct.	48,263	114,819	111,288	1938	342,737
Nov. ...	......	110,275	97,143	1937	1,019,896
Dec. ...	......	116,285	110,970	1936	805,691
				1935	398,988
Total .	......	1,335,295	1,203,504		

Gray Iron Castings

Shipments—Net Tons

	1949	1948	1947	1946
Jan.	1,040,343	1,064,335	1,077,820	727,094
Feb.	986,591	1,024,450	1,009,970	571,894
Mar.	1,074,704	1,169,085	1,089,828	820,111
Apr.	929,307	1,051,083	1,097,150	885,701
May	866,631	992,692	1,097,307	782,850
June	905,573	1,072,040	1,038,356	757,268
July	696,915	914,464	912,939	840,004
Aug.	872,013	1,050,948	951,859	973,232
Sept.	880,647	1,088,051	1,025,089	937,401
Oct.	715,685	1,148,422	1,154,192	1,077,838
Nov.	......	1,099,827	1,020,239	987,069
Dec.	......	1,110,512	1,066,211	909,195
Total ..	......	12,785,909	12,540,960	10,269,657

1945 .. 9,578,295 1944 .. 9,794,541 1943 .. 9,217,800

Malleable Iron Castings

Shipments—Net Tons

	1949	1948	1947	Yearly Totals	
Jan.	71,876	77,927	75,898	1947..	895,054
Feb.	66,744	75,225	74,683	1946..	752,028
Mar.	72,052	86,767	76,602	1945..	790,731
Apr.	61,329	80,602	81,890	1944..	878,233
May	54,572	76,078	75,488	1943..	844,639
June	59,597	81,747	78,524	1942..	746,008
July	44,360	64,995	64,162	1941..	832,173
Aug.	58,121	73,272	62,395	1940..	556,209
Sept.	60,488	77,815	71,568	1939..	466,068
Oct.	57,150	81,761	83,976	1938..	296,003
Nov.	.....	77,194	72,111	1937..	596,622
Dec.	.....	79,882	77,757	1936..	554,670
				1935..	455,208
Total ...	.....	933,265	895,054		

Steel Forgings

Shipments for Sale—Net Tons

	1949	1948	1947	1946
Jan.	124,582	118,534	116,074	92,177
Feb.	111,217	116,676	111,004	62,866
Mar.	120,035	131,111	115,456	87,478
Apr.	104,305	114,314	121,475	105,611
May	91,775	108,546	115,743	88,600
June	100,756	119,165	110,446	93,162
July	70,129	97,281	92,352	86,581
Aug.	95,794	110,679	98,009	108,424
Sept.	88,417	120,500	108,804	101,987
Oct.	81,278	122,873	123,830	118,697
Nov.	......	123,914	103,740	108,112
Dec.	......	131,544	116,798	110,346
Total	......	1,415,137	1,333,731	1,164,041

U. S. Bureau of the Census

Distribution

METALWORKING FACTS AND FIGURES

FINISHED STEEL DISTRIBUTION

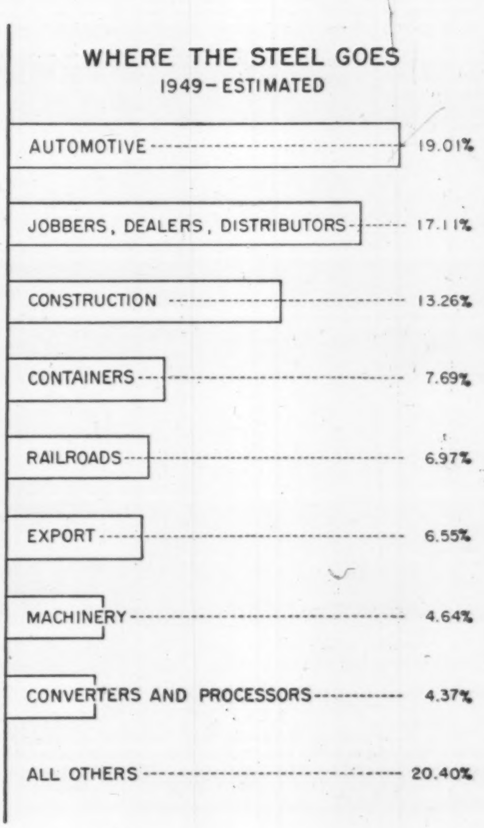
by Market Classifications

(All Grades, Net Tons)

	12 mos. 1949*	12 mos. 1948	12 mos. 1947	12 mos. 1946
Automotive	11,015,585	10,220,982	9,273,363	6,557,199
Jobbers, Dealers, Distributors	9,898,981	11,405,749	10,484,144	9,304,817
Construction, including Maintenance	7,684,327	7,277,018	6,657,205	4,973,111
Containers	4,453,642	5,302,373	5,076,170	4,255,287
Rail Transportation	4,023,831	5,225,535	4,879,879	3,806,746
Export	3,801,403	3,244,888	4,206,692	3,026,771
Machinery, Indus. Equip. & Tools	2,681,633	3,188,718	3,031,719	2,415,517
Converters and Processors	2,519,410	3,348,414	2,772,163	1,882,561
Contractors' Products	2,070,207	2,507,977	2,243,399	1,618,739
Unclassified	1,501,277	3,577,695	4,660,795	3,549,461
Agricultural	1,437,026	1,426,943	1,244,548	1,030,335
Other Domestic & Commercial Equip.	1,270,702	1,713,806	1,680,259	1,398,055
Appliances, Utensils and Cutlery	1,199,400	1,959,878	1,564,722	1,227,154
Electrical Machinery and Equip.	1,060,997	1,594,700	1,595,520	1,154,506
Bolts, Nuts, Rivets, Screws	852,886	1,284,653	1,298,027	1,054,717
Forgings (other than Automotive)	699,371	938,838	741,044	651,706
Shipbuilding, Marine Equipment	660,048	649,613	337,961	283,803
Oil and Gas Drilling	607,399	684,478	930,731	316,366
Mining, Quarrying, Lumbering	280,738	329,090	287,670	209,758
Ordnance, Other Military	81,310	56,029	56,908	30,458
Aircraft	44,108	35,761	39,231	28,465
Total	57,844,281	65,973,138	63,057,150	48,775,532

American Iron & Steel Institute

* Estimated by STEEL on basis of actual shipments in first 8 months.



WHERE THE STEEL GOES

1949—ESTIMATED

DISTRIBUTION

By Market Classifications

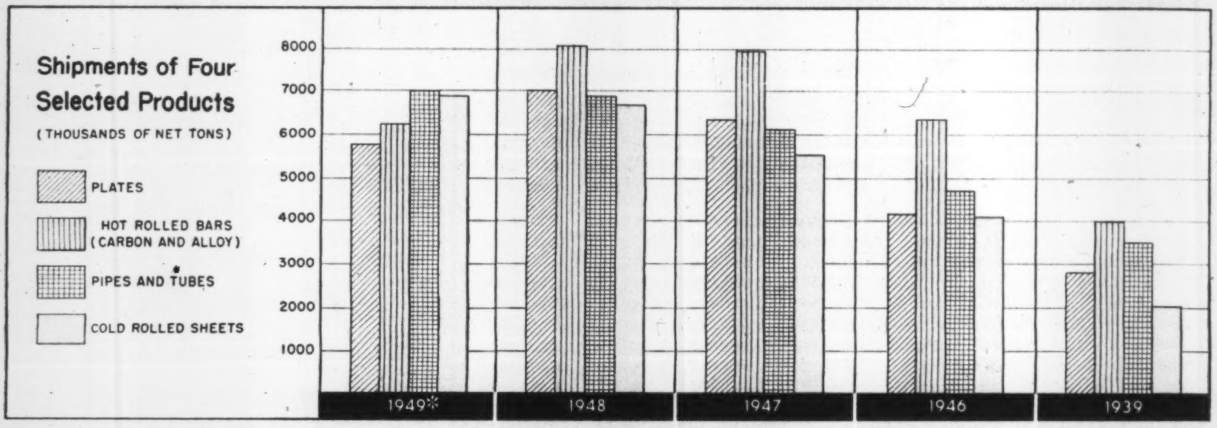
	STAINLESS STEEL (Net Tons)				ALLOY STEEL (Net Tons)				CARBON STEEL	
	8 mos. 1949	12 mos. 1948	12 mos. 1947	12 mos. 1946	8 mos. 1949	12 mos. 1948	12 mos. 1947	12 mos. 1946	8 mos. 1949	12 mos. 1948
Converters and Processors	13,940	23,104	15,140	11,519	54,778	76,887	73,054	168,763	1,904,878	3,248,423
Forgings (other than Automotive)	3,235	3,614	4,297	2,012	201,665	327,454	222,657	182,525	367,896	607,770
Bolts, Nuts, Rivets, Screws	1,645	2,901	2,525	1,900	28,388	58,340	42,340	34,980	611,327	1,223,412
Jobbers, Dealers, Distributors	34,069	75,101	53,364	57,326	214,845	380,728	222,279	226,419	7,158,926	10,949,920
Construction, including Maintenance	4,786	3,261	2,648	2,170	60,806	107,555	71,249	46,429	5,400,158	7,166,202
Contractors' Products	3,553	6,888	4,865	6,486	35,231	68,046	30,629	41,621	1,472,003	2,433,043
Automotive	38,518	50,905	35,800	33,080	1,037,619	1,590,480	1,274,054	1,015,821	6,809,980	8,579,597
Rail Transportation	3,094	9,914	4,298	7,460	112,596	232,281	227,072	139,601	2,984,957	4,983,340
Shipbuilding, Marine Equip.	489	878	827	587	16,244	20,945	11,792	6,997	535,580	627,790
Aircraft	6,746	6,799	4,081	2,693	16,178	14,408	11,065	11,616	9,708	14,554
Oil and Gas Drilling	154	254	674	217	96,135	167,664	156,049	78,611	399,784	516,560
Mining, Quarrying, Lumbering	306	452	388	364	18,927	25,280	19,449	11,073	201,593	303,358
Agricultural	181	402	224	546	31,910	68,679	44,246	27,534	1,040,340	1,357,882
Machinery, Indus. Equip. & Tools	13,457	24,553	23,901	22,146	284,144	469,821	445,808	387,520	1,760,267	2,694,344
Electrical Machinery and Equip.	3,602	5,141	5,635	3,902	214,104	480,324	448,262	357,563	633,841	1,109,235
Appliances, Utensils, Cutlery	19,285	42,741	30,658	31,371	14,213	45,192	23,789	34,196	914,658	1,871,945
Other Domestic & Commercial Equip.	3,840	7,773	7,730	12,836	27,080	46,452	38,594	38,023	903,959	1,659,581
Containers	2,256	6,288	13,159	6,716	14,139	25,177	19,741	14,435	3,316,528	5,270,908
Ordnance, Other Military	813	620	84	154	9,798	4,164	8,811	2,230	59,111	51,245
Unclassified	22,104	41,492	62,775	81,655	64,068	363,841	589,593	402,837	1,239,745	3,172,362
Export	12,231	11,885	22,473	8,736	75,414	107,455	175,475	96,328	2,545,012	3,125,548
Total	188,304	324,966	295,546	293,876	2,628,282	4,681,173	4,156,008	3,325,122	40,270,251	60,966,999

American Iron & Steel Institute

(Net Tons)

Steel Shipments

SHIPMENTS OF STEEL PRODUCTS



Steel Products—Net Tons	1949* Shipments	%	1948 Shipments	%	1947 Shipments	%	1946 Shipments	%	1939 Shipments	%
Ingots, blooms, slabs, billets, tube rounds, sheet and tin bars, etc.	2,131,691	3.7	3,150,754	4.8	2,966,748	4.7	1,949,624	4.0	1,305,866	3.7
Structural shapes (heavy)	3,624,462	6.3	4,255,355	6.5	4,436,129	7.0	3,474,284	7.1	2,544,515	7.3
Steel piling	320,330	0.5	299,537	0.5	324,224	0.5	205,313	0.4	171,428	0.5
Plates (sheared and universal)	5,774,443	10.0	7,000,199	10.6	6,345,216	10.1	4,152,181	8.5	2,793,798	8.0
Skelp	121,431	0.2	75,252	0.1	160,989	0.3	227,033	0.5	226,508	0.6
Rails—Standard (over 60 lbs.)	1,933,895	3.3	1,976,520	3.0	2,207,146	3.5	1,790,311	3.7	1,161,988	3.3
All other	121,602	0.2	214,880	0.3	211,900	0.3	144,999	0.3	125,109	0.4
Joint bars and tie plates	513,151	0.9	626,573	1.0	678,702	1.1	624,299	1.3	466,247	1.3
Track spikes	94,188	0.2	145,830	0.2	163,746	0.3	146,194	0.3	119,719	0.3
Hot-rolled bars—Carbon	......	....	6,196,444	9.4	6,242,416	9.9	5,006,859	10.3	3,292,876	9.4
Alloy	......	....	1,927,309	2.9	1,741,432	2.8	1,390,278	2.8	702,322	2.0
Total carbon and alloy	6,285,358	10.9	8,123,753	12.3	7,983,848	12.7	6,397,137	13.1	3,995,198	11.4
Reinforcing—New billet	......	....	1,329,945	2.0	1,277,075	2.0	1,048,483	2.1	1,038,949	3.0
Reinforcing—Rerolled	......	....	212,021	0.3	175,833	0.3	141,346	0.3	175,253	0.5
Reinforcing—Total	1,583,650	2.7	......	....	......	....	......	....	......	....
Cold-finished bars—Carbon	......	....	1,349,719	2.0	1,426,701	2.3	1,316,579	2.7	592,514	1.7
Alloy	......	....	244,248	0.4	218,802	0.3	196,237	0.4	66,384	0.2
Total carbon & alloy	1,205,066	2.1	1,593,967	2.4	1,645,503	2.6	1,512,816	3.1	658,898	1.9
Tool steel bars	57,135	0.1	88,376	0.1	87,279	0.1	96,020	0.2	45,117	0.1
Pipes and tubes—Total	7,010,699	12.1	6,881,549	10.4	6,117,884	9.7	4,655,505	9.5	3,505,582	10.0
Buttweld	......	....	2,045,361	3.1	1,706,415	2.7	1,276,289	2.6	952,974	2.7
Lapweld	......	....	339,633	0.5	389,762	0.6	305,516	0.6	358,919	1.0
Electricweld	......	....	1,572,139	2.4	1,122,350	1.8	674,459	1.4	267,312	0.8
Seamless	......	....	2,924,416	4.4	2,082,686	3.3	1,871,540	3.8	1,686,665	4.8
Conduit and miscellaneous	217,135	0.4	......	....	155,335	0.2	98,521	0.2	78,850	0.2
Mechanical and pressure tubing	623,478	1.1	......	....	661,336	1.1	429,180	0.9	160,862	0.5
Pipe—Standard	2,096,403	3.6	......	....	......	....	......	....	......	....
Pipe—Line	2,561,523	4.4	......	....	......	....	......	....	......	....
Pipe—Oil country goods	1,398,291	2.4	......	....	......	....	......	....	......	....
Tubes—Boiler	113,869	0.2	......	....	......	....	......	....	......	....
Wire rods	563,819	1.0	610,348	0.9	667,282	1.1	679,998	1.4	550,040	1.6
Wire—Drawn	2,062,994	3.5	2,673,276	4.1	2,590,963	4.1	1,933,124	4.0	1,354,992	3.9
Nails and staples	703,921	1.2	859,540	1.3	799,436	1.3	636,632	1.3	678,786	1.9
Barbed and twisted	223,903	0.4	254,629	0.4	256,991	0.4	207,610	0.4	231,021	0.7
Woven wire fence	354,565	0.6	399,457	0.6	407,295	0.6	383,230	0.8	273,596	0.8
Bale ties	47,231	0.1	113,892	0.2	119,917	0.2	99,993	0.2	59,547	0.1
All other wire products	......	....	......	....	......	....	......	....	5,766	....
Fence posts	......	....	......	....	......	....	......	....	60,439	0.1
Black plate—Total	434,726	0.7	......	....	......	....	......	....	......	....
Ordinary	......	....	821,398	1.3	801,745	1.3	781,167	1.6	269,341	0.8
Chemically treated	......	....	17,268	....	19,252	....	125,170	0.3		
Tin and terne plate—Hot dipped	1,698,637	2.9	2,167,912	3.3	2,093,149	3.3	1,924,657	3.9	2,561,451	7.3
Electrolytic	1,991,939	3.4	1,784,288	2.7	1,617,659	2.6	909,173	1.9		
Sheets—Hot-rolled	6,103,351	10.5	7,786,056	11.8	7,891,798	12.5	5,956,633	12.2	5,087,886	14.6
Cold-rolled	6,882,063	11.9	6,867,775	10.4	5,504,578	8.7	4,075,554	8.4	2,021,859	6.1
Galvanized	1,749,165	3.0	1,643,337	2.5	1,609,881	2.5	1,462,053	3.0	1,394,922	4.0
Long terne	152,880	0.5	......	....	......	....	......	....	......	....
Enameling	153,469	0.3	......	....	......	....	......	....	......	....
Electrical	365,490	0.6	......	....	......	....	......	....	......	....
Strip—Hot-rolled	1,679,691	2.9	1,662,787	2.5	1,740,085	2.7	1,363,812	2.8	1,160,513	3.3
Cold-rolled	1,439,343	2.5	1,783,383	2.7	1,613,005	2.6	1,282,146	2.6	676,397	1.9
Wheels	284,558	0.5	337,376	0.5	356,873	0.6	252,308	0.5	150,750	0.4
Axles	167,435	0.3	215,905	0.3	185,019	0.3	130,461	0.3	73,970	0.2
All other	8,000	....	......	....	......	....	6,266	....	9,724	....
Total steel products	57,844,281	100.0	65,973,138	100.0	63,057,150	100.0	48,775,532	100.0	34,955,175	100.0

American Iron & Steel Institute

* Estimated

Business Indexes

METALWORKING FACTS AND FIGURES

INDEXES OF INDUSTRIAL PRODUCTION SINCE WORLD WAR II

FEDERAL RESERVE BOARD—1935-1939=100

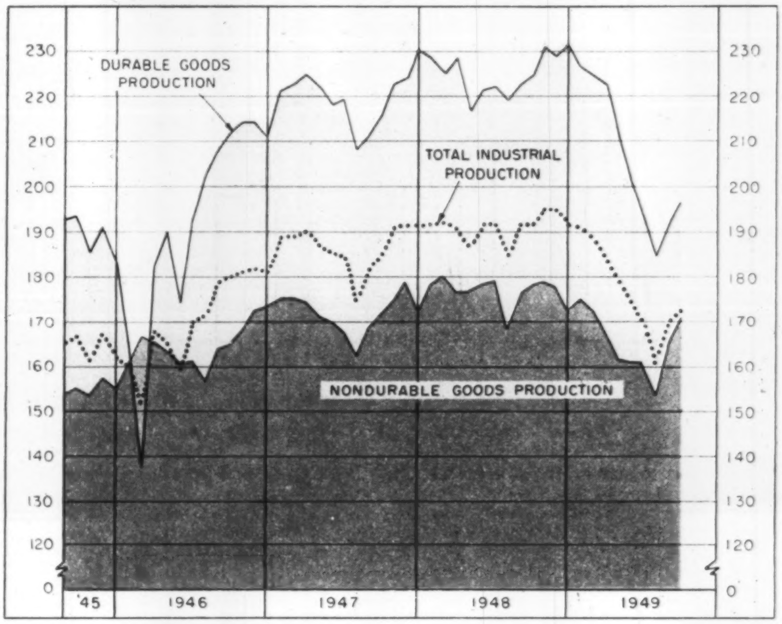
Total Industrial Production

Adjusted for Seasonal Variation

	1949	1948	1947	1946	1945
Jan.	191	193	189	160	...
Feb.	189	194	189	152	...
Mar.	184	191	190	168	...
Apr.	179	188	187	165	...
May	174	192	185	159	...
June	169	192	184	170	...
July	161	186	176	172	...
Aug.	170	191	182	178	...
Sept.	174	192	186	180	167
Oct.	166	195	191	182	162
Nov.	...	195	192	183	168
Dec.	...	192	192	182	163

YEARLY INDEXES—UNADJUSTED

1949* ..	175	1948 ...	192	1947 ...	187
1946 ...	170	1945 ...	203	1944 ...	235
1943 ...	239	1942 ...	199	1941 ...	162
1940 ...	125	1939 ...	109		



Iron and Steel

Adjusted for Seasonal Variation

	1949	1948	1947	1946	1945
Jan.	228	203	193	102	...
Feb.	232	203	192	43	...
Mar.	233	207	197	169	...
Apr.	219	177	196	159	...
May	204	208	198	109	...
June	177	208	194	154	...
July	156	201	182	180	...
Aug.	178	207	189	184	...
Sept.	179	214	190	185	163
Oct.	101	221	205	184	146
Nov.	...	224	203	178	167
Dec.	...	223	206	159	164

Nonferrous Metals and Products Output

Adjusted for Seasonal Variation

	1949	1948	1947	1946	1945
Jan.	183	195	203	150	...
Feb.	185	199	208	141	...
Mar.	183	201	202	139	...
Apr.	167	200	197	132	...
May	145	196	187	128	...
June	133	193	179	137	...
July	127	185	171	150	...
Aug.	141	186	170	159	...
Sept.	157	192	174	172	139
Oct.	152	192	179	184	144
Nov.	...	188	185	192	148
Dec.	...	184	189	197	147

Durable Goods

Adjusted for Seasonal Variation

	1949	1948	1947	1946	1945
Jan.	227	229	221	166	...
Feb.	225	226	223	138	...
Mar.	223	229	225	183	...
Apr.	212	217	222	190	...
May	201	221	218	175	...
June	194	222	219	193	...
July	185	219	208	202	...
Aug.	192	223	211	208	...
Sept.	199	225	216	212	194
Oct.	174	231	223	214	186
Nov.	...	229	224	214	191
Dec.	...	231	230	211	185

Nondurable Goods

Adjusted for Seasonal Variation

	1949	1948	1947	1946	1945
Jan.	175	178	176	161	...
Feb.	173	180	176	167	...
Mar.	168	177	175	166	...
Apr.	162	177	172	164	...
May	161	178	170	161	...
June	161	179	168	162	...
July	154	169	163	157	...
Aug.	165	177	169	164	...
Sept.	172	178	172	165	156
Oct.	176	179	176	168	154
Nov.	...	178	179	173	158
Dec.	...	173	173	174	156

Consumers' Price Index

Cost of Living. 1935—1939=100

	1949	1948	1947
January	170.9	168.8	153.3
February	169.0	167.5	153.2
March	169.5	166.9	156.3
April	169.7	169.3	156.2
May	169.2	170.5	156.0
June	169.6	171.7	157.1
July	168.5	173.7	158.4
August	168.8	174.5	160.3
September	169.6	174.5	163.8
October	168.5	173.6	163.8
November	....	172.2	164.9
December	....	171.4	167.0

MONTHLY AVERAGES

1949*	169.2	1943	123.6
1948	171.2	1942	116.5
1947	159.2	1941	105.2
1946	139.3	1940	100.2
1945	128.4	1939	99.4
1944	125.5		

U. S. Bureau of Labor Statistics

Wholesale Price Indexes

(1926=100)

ALL COMMODITIES

	1949	1948	1947
Jan.	160.6	165.7	142.0
Feb.	158.1	160.9	145.2
Mar.	158.4	161.4	150.0
Apr.	156.9	162.8	148.0
May	155.7	163.9	147.3
June	154.5	166.2	147.7
July	153.5	168.7	150.6
Aug.	152.9	169.8	153.7
Sept.	153.7	168.9	157.4
Oct.	152.2	165.4	158.5
Nov.	....	164.0	159.6
Dec.	....	162.4	163.2

MONTHLY AVERAGES

1949*	155.2	1943	103.1
1948	165.0	1942	98.8
1947	152.1	1941	87.3
1946	121.1	1940	78.6
1945	105.8	1939	77.1
1944	104.0		

U. S. Bureau of Labor Statistics

MANUFACTURED PRODUCTS

	1949	1948	1947
Jan.	156.2	157.8	137.3
Feb.	154.0	154.5	140.5
Mar.	154.1	155.8	143.8
Apr.	153.0	157.6	142.1
May	151.5	158.5	142.0
June	150.7	159.6	142.0
July	149.7	162.6	144.2
Aug.	149.4	164.6	147.9
Sept.	150.1	163.9	151.8
Oct.	149.1	160.2	151.2
Nov.	....	158.7	152.4
Dec.	....	157.5	154.9

MONTHLY AVERAGES

1949* ...	151.5	1943	100.1
1948	159.4	1942	98.6
1947	146.0	1941	89.1
1946	116.1	1940	81.6
1945	101.8	1939	80.4
1944	100.8		

---

* Estimated

Prices

METALWORKING FACTS AND FIGURES

Beehive Metallurgical Coke

Average Price —Net Ton

	1949	1948	1947	1946
Connellsville, furnace	$13.79	$13.55	$10.51	$8.13
Connellsville, foundry	16.27	15.95	12.27	8.88
New River, foundry.	17.35	14.98	12.27	9.54
Wise county, foundry	15.35	13.75	10.87	8.42
Wise county, furnace	14.60	13.07	10.38	7.92

Oven Foundry Coke

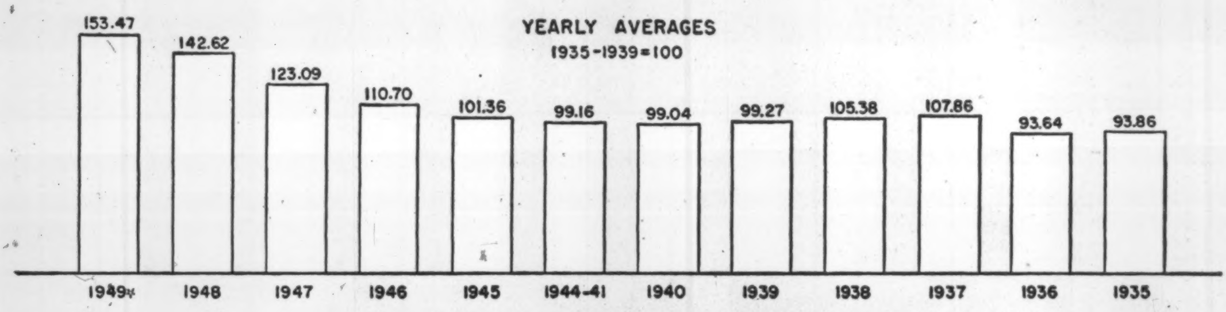
Average Price—Net Ton

Ovens	1949	1948	1947	1946
Kearny, N.J. ..	$21.98	$20.47	$16.08	$13.90
Milwaukee	20.94	20.13	16.96	14.60
Chicago	20.19	19.38	16.23	13.85

Lake Superior Iron Ore

(Per gross ton; 51½% iron)

	1949	1948	1947	1946
Bessemer Old Range .	$7.60	$6.60	$5.95	$5.45
Bessemer Mesabi	7.35	6.35	5.70	5.20
Nonbessemer Old Range	7.45	6.45	5.80	5.30
Nonbessemer Mesabi ..	7.20	6.20	5.55	5.05
High Phosphorus	7.20	6.20	5.55	5.05



FINISHED STEEL—WEIGHTED PRICE COMPOSITE

(Based on average shipments and prices of the following products during 5-year base period 1935-1939: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1949 .	155.05	155.05	154.85	154.01	152.90	152.90	152.80	152.52	152.52	152.52	152.52	154.00*	153.47*
1948 .	132.93	134.56	135.91	135.91	135.02	134.56	143.08	151.99	151.86	151.86	151.86	151.86	142.62
1947 .	117.90	118.67	118.67	118.67	118.67	118.67	120.39	128.96	128.96	128.96	129.28	129.28	123.09
1946 .	101.87	106.82	111.62	111.62	111.62	111.86	112.04	112.04	112.04	112.04	112.04	112.82	110.70
1945 .	100.32	100.65	100.65	100.65	101.10	101.78	101.78	101.85	101.87	101.87	101.87	101.87	101.36
1944 .	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1943 .	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1942 .	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1941 .	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1940 .	99.16	99.16	99.16	97.75	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.04
1939 .	100.50	100.50	100.50	100.50	99.07	98.46	98.42	98.42	98.42	98.54	98.78	99.16	99.27
1938 .	109.94	109.73	109.65	109.65	109.65	107.84	101.84	101.84	101.78	101.31	100.83	100.50	105.38
1937 .	98.44	98.49	108.25	109.60	109.94	109.94	109.94	109.94	109.94	109.94	109.94	109.94	107.86
1936 .	94.00	94.00	92.03	91.62	91.62	91.62	94.09	94.09	93.96	94.78	94.87	96.94	93.64
1935 .	93.93	93.93	93.93	93.80	93.80	93.80	93.80	93.73	93.87	93.87	93.87	94.00	93.86

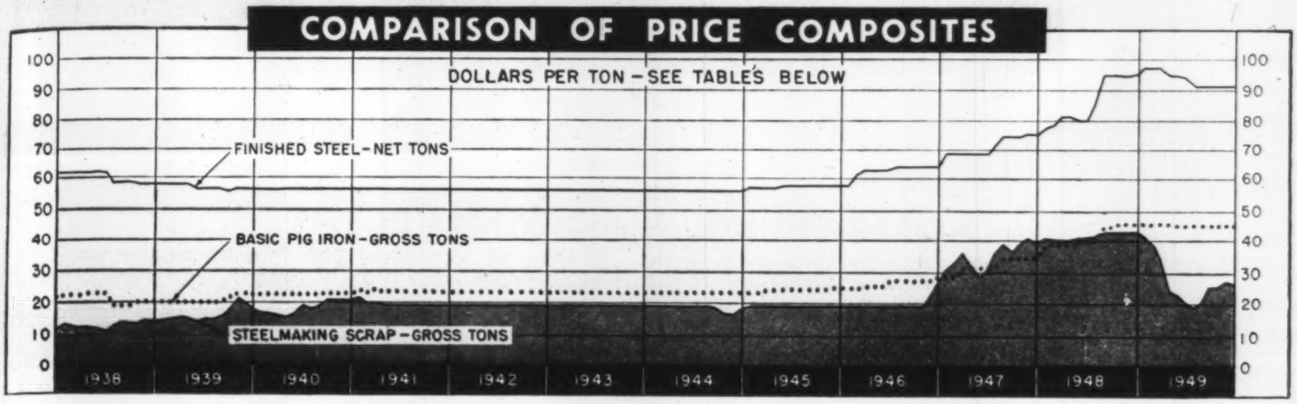
FINISHED STEEL—ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	SHEETS			STRIP		Tin	BARS				Basic	Standard
	H.R.	C.R.	Gal.	H.R.	C.R.	Plate	H.R.	C.F.	Plates	Shapes	Wire	Nails
1949*	$65.22	$80.08	$88.00	$67.75	$84.33	$155.00	$67.55	$80.04	$68.75	$65.24	$84.05	$105.92
1948	60.17	74.83	82.80	62.40	80.36	135.75	62.84	75.63	63.84	60.17	80.10	107.33
1947	52.60	67.03	74.05	52.60	67.03	116.00	54.60	67.03	55.53	52.53	70.67	84.44
1946	48.03	64.80	79.50	47.33	60.56	104.38	49.46	61.21	49.38	46.38	60.25	69.61
1945	43.92	61.00	73.50	42.00	56.00	100.00	44.25	53.83	44.50	42.00	53.83	57.08
1944	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1943	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1942	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1941	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1940	41.80	60.80	70.00	41.75	55.75	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1939	41.25	62.08	70.00	41.25	57.08	100.00	43.75	53.33	42.00	42.00	52.00	49.17
1938	45.42	66.67	72.92	45.25	61.08	106.00	47.00	56.00	43.50	43.50	55.00	52.00
1937	47.08	69.92	74.50	47.08	62.75	104.33	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.25	60.00	63.25	38.25	52.33	105.00	38.50	44.42	37.00	37.00	48.17	42.83
1935	37.00	59.00	62.00	37.00	52.00	105.00	36.33	40.00	36.00	36.00	46.00	50.58
1934	37.08	58.75	61.25	37.17	51.75	105.00	36.17	42.00	35.67	35.67	45.42	50.58
1933	33.17	51.83	54.92	31.83	42.17	88.67	32.75	36.08	32.17	32.50	42.25	39.92
1932	34.08	55.17	56.33	28.92	39.75	93.75	31.67	35.75	31.67	31.67	44.00	39.00
1931	37.25	62.83	57.58	30.58	43.33	98.75	32.50	41.67	32.33	32.08	44.00	37.75
1930	40.17	73.00	63.00	33.67	49.33	103.75	34.42	41.83	34.17	34.17	46.67	42.50
1929	43.33	81.58	71.33	37.75	55.33	107.00	38.50	45.25	38.56	38.58	49.42	51.58
1928	40.75	80.67	71.75	36.92	56.83	105.25	37.50	44.00	37.50	37.50	49.00	51.58
1927	44.08	83.83	75.17	41.67	61.25	108.83	36.75	45.67	36.42	36.67	48.25	51.00

---

* Estimated



COMPARISON OF PRICE COMPOSITES

FINISHED STEEL — ARITHMETICAL PRICE COMPOSITE

(In dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, and standard and line pipe. Based on basing point prices through June, 1948; mill prices for subsequent months.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1949	$97.75	$97.77	$97.17	$94.18	$93.36	$92.06	$91.82	$91.62	$91.55	$91.62	$91.64	$91.87†	$93.53†
1948	78.26	79.86	81.14	81.14	80.27	80.27	86.18	95.05	95.05	95.05	95.16	95.50	86.91
1947	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33
1946	58.27	60.91	63.54	63.54	63.54	64.09	64.45	64.45	64.45	64.45	64.45	64.75	63.41
1945	57.35	57.55	57.55	57.55	57.73	58.27	58.27	58.27	58.27	58.27	58.27	58.27	57.97
1944	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1943	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1942	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1941	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1940	56.73	56.73	56.73	56.08	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.68
1939	57.36	57.36	57.36	57.36	56.74	56.36	56.29	56.27	56.27	56.49	56.54	56.73	56.76
1938	62.18	62.05	62.00	62.00	62.00	61.45	58.00	58.00	58.00	57.78	57.52	57.36	59.86

BASIC PIG IRON PRICE COMPOSITE

Average of basic pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1949	$46.26	$46.22	$46.22	$46.16	$45.66	$45.60	$45.60	$45.60	$45.60	$45.60	$45.60	$45.60	$45.81
1948	38.50	39.30	39.34	39.21	39.66	40.49	41.42	44.12	44.62	46.19	46.29	46.29	42.12
1947	29.56	29.59	32.40	32.49	32.49	32.49	33.82	36.06	36.14	36.18	36.38	36.31	33.66
1946	24.75	24.75	25.13	25.50	25.50	27.50	27.50	27.50	27.50	27.50	27.50	29.10	26.64
1945	23.00	23.50	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.19	24.75	24.75	24.01
1944	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1943	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1942	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1941	22.80	22.95	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.02
1940	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.32	22.07
1939	20.05	20.05	20.05	20.05	20.05	20.05	20.05	20.05	21.05	22.05	22.05	22.05	20.68
1938	22.92	22.92	22.92	23.02	23.05	23.05	19.05	19.05	19.05	20.05	20.05	20.05	21.20

MALLEABLE PIG IRON COMPOSITE

Average of malleable pig iron prices (per gross ton) at Bethlehem, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1949	$47.39	$47.34	$47.34	$47.31	$47.27	$47.27	$47.27	$47.27	$47.27	$47.27	$47.27	$47.27	$47.30
1948	39.58	40.39	40.45	40.29	40.70	41.54	42.32	44.87	45.30	47.20	47.41	47.41	43.12
1947	30.79	30.79	33.50	33.71	33.71	33.71	34.94	37.07	37.16	37.19	37.49	37.40	34.79
1946	26.04	26.04	26.41	26.79	26.79	28.79	28.79	28.79	28.79	28.79	28.79	30.36	27.93
1945	24.29	24.79	25.29	25.29	25.29	25.29	25.29	25.29	25.29	25.48	26.04	26.04	25.31
1944	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29
1943	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29
1942	24.32	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29

No. 2 FOUNDRY PIG IRON COMPOSITE

Average of No. 2 foundry pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1949	$46.67	$46.63	$46.63	$46.60	$46.13	$46.07	$46.08	$46.10	$46.10	$46.10	$46.10	$46.10	$46.28
1948	38.94	39.77	39.81	39.68	40.10	40.96	41.83	44.47	44.58	46.50	46.69	46.69	42.50
1947	30.17	30.17	32.80	32.99	32.99	32.99	34.32	36.54	36.62	36.64	36.85	36.78	34.16
1946	25.42	25.42	25.80	26.17	26.17	28.17	28.17	28.17	28.17	28.17	28.17	29.73	27.31
1945	23.67	24.17	24.67	24.67	24.67	24.67	24.67	24.67	24.67	24.86	25.42	25.42	24.69
1944	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67
1943	23.67	23.67	23.67	23.67	28.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67
1942	23.70	23.69	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67

STEELMAKING SCRAP PRICE COMPOSITE

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago and eastern Pennsylvania.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1949	$41.54	$38.48	$34.60	$24.06	$22.29	$20.85	$19.21	$20.86	$26.07	$26.71	$28.96	$28.50†	$27.68†
1948	40.75	40.48	40.21	40.41	40 67	40.67	41.43	43.33	43.33	43.25	43.25	43.25	41.75
1947	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05
1946	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	22.22	27.69	20.13
1945	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1944	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	18.00	16.50	16.40	18.54	18.95
1943	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1942	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1941	21.00	20.05	20.15	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.50
1940	17.60	17.10	16.55	16.19	17.30	19.15	18.65	18.80	20.20	20.70	20.80	21.40	18.70
1939	14.90	14.95	15.15	14.80	14.10	14.60	14.90	15.35	18.15	21.55	20.15	17.95	16.40
1938	14.10	13.70	13.40	12.60	11.60	11.10	13.30	14.55	14.35	14.15	14.70	14.90	13.55

---

† Preliminary

Prices

METALWORKING FACTS AND FIGURES

AVERAGE MONTHLY QUOTATIONS IN 1949

Finished Steel Prices are cents per pound unless otherwise noted; Coke, dollars per net ton; Other Products, dollars per gross ton. All prices are mill or furnace, unless otherwise noted. December figures subject to revision.

PITTSBURGH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Structural Shapes	3.275c	3.275c	3.270c	3.250c	3.250c	3.250c	3.250c	3.250c	3.250c	3.250c	3.250c	3.325c
Plates	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.45
Bars, Hot-Rolled	3.45	3.45	3.43	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.40
Bars, Cold-Finished	4.10	4.10	4.05	3.975	3.975	3.975	3.975	3.975	3.975	3.975	3.975	3.975
Sheets, Hot-Rolled	3.275	3.275	3.275	3.26	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.30
Sheets, Cold-Rolled	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.05
Sheets, No. 10 Galvanized	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40
Strip, Hot-Rolled	3.275	3.275	3.40	3.50	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Strip, Cold-Rolled	4.375	4.375	4.375	4.375	4.375	4.375	4.275	4.00	4.00	4.00	4.00	4.075
Standard Spikes	5.25	5.25	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35
Plain Wire	4.325	4.325	4.255	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.325
Wire Nails	5.775	5.775	5.525	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.225
Structural Rivets	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75
Tin Plate, 1.50-pound coating (base box)	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75	$7.75
Steel Pipe, Buttweld, 1-3 in., % discount from list	49½	49½	49½	49½	49½	49½	49½	49½	49½	49½	49½	47
Pig Iron, Bessemer, Neville Island	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00	$47.00
Pig Iron, Basic, Neville Island	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00
Pig Iron, No. 2 Foundry, Neville Island	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50
Pig Iron, Malleable, Neville Island	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50
Blast Furnace Silvery Pig Iron, 9.01-9.50% Si, Jackson, O., furnace	67.00	67.00	67.00	66.62	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50
Billets, Bessemer and Open-Hearth	59.00	59.00	56.20	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.50
Wire Rods	3.775	3.775	3.775	3.775	3.775	3.40	3.40	3.40	3.40	3.40	3.40	3.625
Furnace Coke, spot	$14.50	$14.50	$14.50	$14.44	$14.25	$13.70	$13.25	$13.25	$13.25	$13.25	$13.25	$13.25
Foundry Coke, spot	17.00	17.00	17.00	17.00	16.75	16.15	15.75	15.75	15.75	15.75	15.75	15.60
Scrap, No. 1 Heavy Melting Steel	41.90	40.00	36.30	25.12	23.25	22.60	21.00	22.13	28.20	29.50	31.50	31.40
Scrap, Low Phosphorous	48.50	45.25	40.60	27.62	25.25	24.05	23.25	24.63	29.80	31.65	33.90	35.10
Scrap, No. 1 Cast	59.75	58.40	46.00	32.25	23.25	22.75	22.31	27.44	34.10	35.50	36.70	35.50

CHICAGO	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Bars, Steel	3.35c	3.35c	3.35c	3.35c	3.35c	3.35c	3.35c	3.35c	3.35c	3.35c	3.35c	3.40c
Plates	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.45
Structural Shapes	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.325
Bars, Rail Steel	†	†	†	†	†	†	†	†	3.35	3.30	3.30	3.30
Sheets, Cold-Rolled	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.05
Pig Iron, No. 2 Foundry	$46.25	$46.25	$46.25	$46.25	$46.25	$46.25	$46.31	$46.50	$46.50	$46.50	$46.50	$46.50
Pig Iron, Malleable	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50
Scrap, No. 1 Heavy Melting Steel	39.38	35.75	33.80	23.75	21.50	20.70	19.50	21.50	25.50	26.70	30.00	28.30
Scrap Rails for Rerolling	59.38	48.19	44.45	31.31	27.75	27.75	27.75	32.81	39.75	41.50	44.50	43.70
Scrap, No. 1 Machinery Cast	58.38	44.25	39.70	30.25	27.50	27.50	29.00	36.50	41.00	41.50	42.25	39.50

---

†Not publicly quoted.

EASTERN PENNSYLVANIA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Tank Plates, del. Philadelphia	3.7217c	3.7256c	3.7256c	3.6348c	3.6348c	3.5848c	3.5848c	3.5848c	3.59c	3.59c	3.59c	3.61c
Structural Shapes, del. Philadelphia	3.4888	3.4918	3.4918	3.4918	3.4918	3.4918	3.4918	3.4918	3.50	3.50	3.50	3.54
Steel Bars, del. Philadelphia	3.8094	3.8164	3.8164	3.8164	3.8164	3.8164	3.8164	3.8164	3.83	3.83	3.83	3.85
Sheets, Hot-Rolled, del. Philadelphia	3.51	3.51	3.51	3.51	3.51	3.51	3.51	3.51	3.54	3.54	3.54	3.56
Pig Iron, Basic, del. Philadelphia	$50.2676	$50.3002	$50.3002	$49.6175	$49.39	$49.39	$49.39	$49.39	$49.44	$49.44	$49.44	$49.44
Pig Iron, No. 2 Foundry, del. Philadelphia	50.7676	50.8002	50.8002	50.1175	49.89	49.89	49.89	49.89	49.94	49.94	49.94	49.94
Pig Iron, Standard Low Phos, del. Philadelphia	56.9364	56.9786	56.9786	56.9786	56.9786	56.9786	56.9786	56.9786	57.09	56.9786	57.09	57.09
Scrap, No. 1 Heavy Melting Steel	43.375	39.6875	34.00	23.31	22.125	19.25	17.125	18.94	24.00	24.50	25.75	25.00
Scrap, No. 1 Cupola	55.375	45.25	35.40	27.00	26.875	25.00	24.25	27.125	35.30	33.125	35.25	35.20
Spiegeleisen, 19-21%, Palmerton, Pa., furnace	62.00	62.00	63.80	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00

COAL CHEMICALS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Benzol, per gallon, producers' plants, tank lots	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c	20.00c
Toluol, one degree, per gallon, delivered, tank lots	23.50	23.50	23.50	23.50	21.81	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Xylol, per gallon, delivered, tank lots	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50
Phenol, per pound, producers' plants, less than carlots	14.25	14.25	14.25	14.25	14.25	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Sulphate of Ammonia, per ton, bulk, f.o.b. Atlantic Seaboard	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00

Nonferrous Prices

METALWORKING FACTS AND FIGURES

NONFERROUS METAL PRICES

(Cents per pound)

	1949												Yearly Averages		
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.*	1948	1947	1946
Copper Sheets[1]	37.180	37.180	37.180	35.805	32.180	30.880	30.895	31.300	31.300	31.300	31.960	32.180	35.230	33.046	24.617
Copper Rods[1]	33.280	33.280	34.530	31.655	28.030	26.730	26.745	27.150	27.150	27.150	27.810	28.030	31.381	29.358	21.032
Copper Tubing[1]	37.220	37.220	37.220	35.845	32.220	30.720	30.935	31.340	31.340	31.340	32.000	32.220	35.270	33.086	24.822
Yellow Brass Sheets[1]	34.590	34.590	34.485	32.603	30.268	27.902	27.665	28.190	28.190	28.190	28.565	28.690	31.751	29.099	22.652
Yellow Brass Rods[1]	38.160	38.160	29.118	27.080	24.098	22.474	22.210	22.760	22.760	22.760	23.083	23.190	28.700	23.854	17.931
Yellow Brass Tubing[1]	37.600	37.600	37.496	35.613	32.528	30.912	30.675	31.200	31.200	31.200	31.575	31.700	34.648	31.858	25.406
Bronze Sheets[2]	36.880	36.880	36.850	35.318	31.855	30.320	30.400	30.840	30.840	30.840	31.418	31.610	34.753	32.522	24.674
Bronze Rods[2]	36.570	36.570	36.540	35.158	31.545	30.010	30.090	30.530	30.530	30.530	31.108	31.300	34.443	32.197	24.547
Bronze Tubing[2]	39.540	39.540	39.510	39.978	34.515	32.980	33.060	33.500	33.500	33.500	34.078	34.270	37.286	34.917	27.078
Nickel Silver Sheets[3]	46.920	46.920	46.860	45.468	42.778	42.694	41.373	41.780	41.780	41.780	42.148	42.270	44.183	41.794	30.965
Phosphor Bronze Sheets[4]	56.050	56.050	56.352	54.883	51.295	49.952	50.083	50.470	50.470	50.470	50.793	50.900	54.126	51.165	41.554
Zinc Sheets[1]	22.250	22.250	21.800	18.563	16.875	14.700	14.188	14.500	15.100	15.500	15.500	15.500	17.998	15.517	13.549
Yellow Brass Wire[1]	34.880	34.880	34.776	32.893	29.808	28.192	27.955	28.480	28.480	28.480	28.855	29.980	32.065	29.389	22.949
Copper Magnet Wire[5]	33.125	33.125	33.125	32.344	28.625	27.200	27.219	27.625	27.625	27.625	28.281	28.500	31.704	30.400	21.541
Weatherproof Copper Wire[6]	29.725	29.725	29.725	29.099	26.194	25.125	25.139	25.318	24.943	24.943	25.436	25.200	28.419	27.723	20.466
Bare Copper Wire[6]	29.425	29.425	29.425	28.550	24.675	23.125	23.144	23.300	22.550	22.550	23.206	22.821	28.060	26.962	18.667
85-5-5-5 Brass Ingot[7]	21.313	20.281	19.000	17.500	16.281	14.975	15.138	15.406	15.900	16.156	17.781	17.550	20.382	19.374	15.069
80-10-10 Brass Ingot[8]	27.250	26.500	24.950	23.250	21.750	20.000	20.500	20.500	21.000	21.188	22.500	22.150	25.747	23.167	17.879
80-10-2 Brass Ingot[9]	31.000	30.625	29.100	27.000	25.500	23.500	24.000	24.000	24.500	24.688	26.000	25.650	29.504	26.345	18.556
No. 1 Yellow Ingot[10]	17.406	17.094	16.125	14.938	13.844	12.675	12.875	13.156	13.700	13.906	15.125	15.125	16.391	15.457	11.900

---

[1]F.o.b. mill. [2]90% Cu; f.o.b. mill. [3]18% Ni; f.o.b. mill. [4]Grade A; f.o.b. mill. [5]f.o.b. destination. [6]Carlots; f.o.b. eastern mill. [7]No. 115; delivered. [8]No. 305; delivered. [9]No. 215; delivered. [10]No. 405; delivered.

COPPER

Electrolytic; cents per lb, delivered
Connecticut Valley

	1949	1948	1947	Yearly Averages
Jan.	23.500	21.500	19.600	1949*.19.499
Feb.	23.500	21.500	20.000	1948..22.317
Mar.	23.486	21.500	21.130	1947..21.215
Apr.	21.774	21.500	21.500	1946..14.043
May	18.045	21.500	21.650	1945..12.000
June	16.606	21.500	21.700	1944..12.000
July	17.279	21.574	21.500	1943..12.000
Aug.	17.625	23.230	21.500	1942..12.000
Sept.	17.625	23.500	21.500	1941..12.000
Oct.	17.625	23.500	21.500	1940..11.528
Nov.	18.427	23.500	21.500	1939..11.198
Dec.	18.500*	23.500	21.500	1938..10.226

ZINC

Prime Western; cents per lb, East St. Louis

	1949	1948	1947	Yearly Averages
Jan.	17.500	11.056	10.500	1949*.12.150
Feb.	17.500	12.000	10.500	1948..13.563
Mar.	17.056	12.000	10.500	1947..10.500
Apr.	14.085	12.000	10.500	1946...8.727
May	11.880	12.000	10.500	1945...8.250
June	9.548	12.000	10.500	1944...8.250
July	9.346	12.444	10.500	1943...8.250
Aug.	10.000	15.000	10.500	1942...8.250
Sept.	10.058	15.000	10.500	1941...7.478
Oct.	9.317	15.173	10.500	1940...6.339
Nov.	9.760	16.580	10.500	1939...5.113
Dec.	9.750*	17.500	10.500	1938...4.613

CADMIUM

Regular shapes; dollars per lb, del.

	1949	1948	1947	1946	1943-45
Jan.	2.00	1.75	1.50	0.90	0.90
Feb.	2.00	1.75	1.56	0.90	0.90
Mar.	2.00	1.75	1.69	0.90	0.90
Apr.	2.00	1.75	1.75	0.90	0.90
May	2.00	1.75	1.75	0.90	0.90
June	2.00	1.75	1.75	0.90	0.90
July	2.00	1.75	1.75	0.99	0.90
Aug.	2.00	1.90	1.75	1.25	0.90
Sept.	2.00	1.90	1.75	1.25	0.90
Oct.	2.00	1.90	1.75	1.25	0.90
Nov.	2.00	1.94	1.75	1.31	0.90
Dec.	2.00	2.00	1.75	1.50	0.90
Average	2.00	1.82	1.71	1.08	0.90

ANTIMONY

Domestic, bulk, carlots; cents per lb,
f.o.b. Laredo, Tex.

	1949	1948	1947	Yrly Average
Jan.	38.500	33.000	28.250	1949*.36.875
Feb.	38.500	33.000	28.250	1948..35.010
Mar.	38.500	33.000	29.563	1947..31.922
Apr.	38.500	33.000	33.000	1946..15.972
May	38.500	33.700	33.000	1945..14.500
June	38.500	35.000	33.000	1944..14.500
July	38.500	35.000	33.000	1943..14.500
Aug.	38.500	35.000	33.000	1942..14.417
Sept.	38.500	35.000	33.000	1941‡.16.500
Oct.	32.000	37.423	33.000	1940‡.16.500
Nov.	32.000	38.500	33.000	1939‡.14.425
Dec.	32.000*	38.500	33.000	1938‡.14.667

‡ Delivered New York.

ALUMINUM

99% plus, ingots; cents per lb, f.o.b.
shipping point

	1949	1948	1947	Yearly Averages
Jan.	17.000	15.000	15.000	1949..17.000
Feb.	17.000	15.000	15.000	1948..15.764
Mar.	17.000	15.000	15.000	1947..15.000
Apr.	17.000	15.000	15.000	1946..15.000
May	17.000	15.000	15.000	1945..15.000
June	17.000	15.000	15.058	1944..15.000
July	17.000	15.000	15.500	1943..15.000
Aug.	17.000	15.000	16.269	1942..15.000
Sept.	17.000	15.000	16.500	1941..16.500
Oct.	17.000	15.000	16.846	1940..18.692
Nov.	17.000	15.000	17.000	1939..20.000
Dec.	17.000	15.000	17.000	1938..20.000

LEAD

Common grade; cents per lb, St. Louis

	1949	1948	1947	Yearly Averages
Jan.	21.325	14.825	12.730	1949*.15.191
Feb.	21.325	14.825	13.069	1948..17.867
Mar.	18.825	14.825	14.825	1947..14.504
Apr.	15.017	17.037	14.825	1946...7.957
May	13.566	17.325	14.825	1945...6.350
June	11.850	17.325	14.825	1944...6.350
July	13.335	17.621	14.825	1943...6.350
Aug.	14.806	19.325	14.825	1942...6.331
Sept.	14.853	19.325	14.825	1941...5.643
Oct.	13.242	19.325	14.825	1940...5.029
Nov.	12.348	21.325	14.825	1939...4.904
Dec.	11.800*	21.325	14.825	1938...4.585

COBALT

97-98%; dollars per lb for 550 lb keg

	1949	1948	1947	1945-46	1944	1943
Jan.	1.65	1.65	1.50	1.50	2.11	2.11
Feb.	1.65	1.65	1.50	1.50	2.11	2.11
Mar.	1.65	1.65	1.50	1.50	2.11	2.11
Apr.	1.80	1.65	1.50	1.50	2.11	2.11
May	1.80	1.65	1.50	1.50	2.11	2.11
June	1.80	1.65	1.50	1.50	2.11	2.11
July	1.80	1.65	1.53	1.50	2.11	2.11
Aug.	1.80	1.65	1.65	1.50	2.11	2.11
Sept.	1.80	1.65	1.65	1.50	2.11	2.11
Oct.	1.80	1.65	1.65	1.50	2.11	2.11
Nov.	1.80	1.65	1.65	1.50	2.11	2.11
Dec.	1.80	1.65	1.65	1.50	1.50	2.11
Av.	1.76	1.65	1.57	1.50	2.06	2.11

SILVER

Open market, cents per fine oz, New York

	1949	1948	1947	Yearly Averages
Jan.	70.000	74.625	77.900	1949*.71.932
Feb.	70.838	74.625	72.000	1948..74.665
Mar.	71.500	74.625	76.531	1947..71.959
Apr.	71.500	74.625	75.844	1946†.80.151
May	71.500	74.625	72.350	1945†.51.928
June	71.500	74.625	67.906	1944†.44.750
July	71.500	74.625	63.400	1943†.44.750
Aug.	71.889	73.790	66.050	1942†.38.333
Sept.	73.202	75.284	70.531	1941†.34.783
Oct.	73.250	77.226	71.750	1940†.34.773
Nov.	73.250	73.655	74.625	1939†.39.082
Dec.	73.250*	73.655	74.625	1938†.43.225

† As reported by Handy & Harman, New York.

NICKEL

Electrolytic Cathodes, 99.5%, base sizes,
unpacked, cents per lb, f.o.b. refinery

	1949	1948	1947	Yearly Averages
Jan.	40.000	33.750	35.000	1949*.40.000
Feb.	40.000	33.750	35.000	1948..36.528
Mar.	40.000	33.750	35.000	1947..35.000
Apr.	40.000	35.750	35.000	1946..31.850
May	40.000	35.750	35.000	1945..35.000
June	40.000	33.750	35.000	1944..35.000
July	40.000	35.833	35.000	1943..35.000
Aug.	40.000	40.000	35.000	1942..35.000
Sept.	40.000	40.000	35.000	1941..35.000
Oct.	40.000	40.000	35.000	1940..35.000
Nov.	40.000	40.000	35.000	1939..35.000
Dec.	40.000*	40.000	35.000	1938..35.000

TIN

Straits, spot; cents per lb, New York

	1949	1948	1947	Yearly Averages
Jan.	103.000	94.000	70.000	1949*.99.248
Feb.	103.000	94.000	70.000	1948..99.250
Mar.	103.000	94.000	70.000	1947..77.975
Apr.	103.000	94.000	80.000	1946..54.563
May	103.000	94.000	80.000	1945..52.000
June	103.000	103.000	80.000	1944..52.000
July	103.000	103.000	80.000	1943..52.000
Aug.	103.000	103.000	80.000	1942..52.000
Sept.	101.654	103.000	80.000	1941..52.032
Oct.	95.505	103.000	80.000	1940..49.841
Nov.	89.823	103.000	80.000	1939..49.027
Dec.	79.155*	103.000	85.704	1938..42.216

IRIDIUM

Dollars per troy ounce

	1949	1948	1947	1946	1943-45
Jan.	112.50	85.00	112.00	165.00	165.00
Feb.	107.50	86.88	110.00	165.00	165.00
Mar.	105.00	97.50	106.50	165.00	165.00
Apr.	105.00	112.00	91.50	165.00	165.00
May	105.00	115.00	90.00	165.00	165.00
June	105.00	112.50	86.25	123.75	165.00
July	105.00	107.00	85.00	121.25	165.00
Aug.	105.00	115.00	85.00	125.00	165.00
Sept.	105.00	114.50	85.00	125.00	165.00
Oct.	105.00	112.50	85.00	125.00	165.00
Nov.	105.00	112.50	85.00	125.00	165.00
Dec.	105.00	112.50	85.00	123.75	165.00
Av.	105.83	106.91	92.19	141.15	165.00

PLATINUM

Dollars per ounce

	1949	1948	1947	1946	1945
Jan.	90.00	67.50	59.90	35.00	35.00
Feb.	86.75	70.50	59.50	35.00	35.00
Mar.	77.30	73.50	59.00	35.00	35.00
Apr.	73.50	94.70	61.50	35.00	35.00
May	73.50	99.50	61.20	35.00	35.00
June	71.70	85.50	57.25	49.63	35.00
July	70.50	87.90	54.50	68.50	35.00
Aug.	70.50	94.50	57.00	78.90	35.00
Sept.	70.50	94.50	67.50	86.50	35.00
Oct.	70.50	94.50	67.50	78.80	35.00
Nov.	70.50	94.50	67.50	70.50	35.00
Dec.	70.50	93.50	67.50	65.00	35.00
Average	74.65	87.55	61.65	56.07	35.00

* Estimated.

Nonferrous Metals

COPPER—BRASS

COPPER PRODUCTION, SHIPMENTS AND STOCKS

DOMESTIC STATISTICS—Net Tons

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1949					
11 Mos.	701,318	126,510	969,602	924,946	139,285
Jan.	53,066	16,372	78,298	94,070	91,053
Feb.	58,751	18,190	80,275	97,861	83,841
Mar.	79,256	17,867	88,165	113,154	68,450
Apr.	75,703	15,886	93,873	76,134	76,494
May	70,703	10,555	98,139	32,566	128,441
June	63,639	8,412	92,118	45,653	166,925
July	56,360	6,089	85,638	45,316	212,817
Aug.	55,930	6,349	85,577	90,739	217,167
Sept.	57,460	7,410	79,949	103,115	193,890
Oct.	62,775	6,277	86,882	108,192	164,464
Nov.	67,675	13,103	92,688	118,146	139,285
1948	850,088	130,410	1,233,697	1,344,445	96,080
1947	871,391	105,307	1,196,393	1,383,666	76,035
1946	618,757	32,503	604,071	1,260,921	80,832
1945	792,126	49,541	843,113	1,517,842	76,512
1944	995,938	60,242	1,098,788	1,636,295	66,780
1943	1,111,022	83,677	1,206,871	1,643,677	52,121
1942	1,098,007	54,337	1,135,708	1,635,236	65,309
1941	985,288	31,708	1,065,667	1,545,541	75,564

Copper Institute

FOREIGN STATISTICS—Net Tons

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1949					
11 Mos.	1,173,491	9,256	992,853	856,037	148,161
Jan.	112,314	891	96,210	77,546	172,909
Feb.	106,175	967	87,004	74,327	165,462
Mar.	119,825	904	100,686	85,750	156,790
Apr.	110,734	1,268	96,513	75,424	159,852
May	113,945	581	96,743	79,644	165,271
June	110,500	681	97,449	86,475	162,798
July	98,472	488	81,277	71,333	161,299
Aug.	92,625	311	84,304	76,634	152,840
Sept.	99,860	443	82,946	74,615	150,181
Oct.	104,101	1,696	85,150	75,391	151,443
Nov.	104,945	1,026	84,571	78,898	148,161
1948	1,271,884	8,526	1,072,229	901,073	175,669
1947	1,229,825	8,995	1,016,856	921,851	143,979

Total Domestic and Foreign

Period	Primary	Secondary	Refined	Deliveries To Customers	Refined Stocks End of Period
1949					
11 Mos.	1,874,814	135,796	1,954,455	1,780,983	287,446
1948	2,121,972	138,936	2,305,926	2,245,518	271,749
1947	2,101,216	114,302	2,213,249	2,305,517	220,014

Imports of Copper

Unrefined, Scrap, Refined—Net Tons

	1949	1948	1947	1946	1945
January	48,329	30,435	26,261	60,026	55,931
February	59,158	46,638	26,114	15,583	84,260
March	64,790	46,981	26,291	8,193	83,961
April	48,702	37,727	23,203	25,666	79,490
May	48,802	33,271	40,138	31,193	80,818
June	46,570	46,840	52,527	20,510	72,470
July	33,829	46,684	37,524	35,755	114,562
August	45,372	39,736	44,185	21,272	64,710
September	.....	35,423	41,596	25,182	70,422
October	.....	36,947	44,045	32,508	82,367
November	.....	35,491	36,902	33,182	50,860
December	.....	52,222	54,513	45,431	56,469
Monthly Average	.....	40,700	37,775	29,541	74,693

U. S. Bureau of the Census

Exports of Copper

Refined and Manufactures—Net Tons

	1949	1948	1947	1946	1945
January	21,041	18,013	14,921	12,427	14,910
February	10,653	18,297	11,068	10,966	10,712
March	15,415	15,043	13,467	7,336	12,523
April	11,248	23,272	11,721	6,267	14,610
May	14,910	19,861	14,021	4,225	18,945
June	17,066	21,079	17,254	7,341	10,320
July	10,349	15,069	14,569	7,489	10,259
August	8,695	20,623	21,606	9,173	6,338
September	.....	12,085	18,337	5,386	6,219
October	.....	17,861	19,295	2,131	9,511
November	.....	11,636	22,497	10,564	10,908
December	.....	13,725	18,299	14,168	7,301
Monthly Average	.....	17,214	16,421	8,123	11,046

U. S. Bureau of the Census

Brass Ingot Shipments

Net Tons

	1949	1948	1947	1946
Jan.	19,456	26,998	27,841	29,196
Feb.	15,026	22,487	24,686	24,580
Mar.	14,550	24,282	27,477	27,176
Apr.	10,695	25,177	24,577	32,731
May	11,114	23,716	19,525	27,333
June	9,696	24,401	16,929	31,349
July	10,220	20,456	16,728	26,677
Aug.	14,194	24,098	18,589	27,896
Sept.	16,208	23,641	19,025	27,390
Oct.	18,036	21,559	22,806	31,461
Nov.	.....	21,731	21,666	29,232
Dec.	.....	20,954	23,862	27,206
Total	.....	279,500	263,711	342,227

Compiled by Ingot Brass & Bronze Industry, representing in excess of 95 per cent of brass and bronze industry

Copper and Copper-base Alloy Castings Shipments

Thousands of Pounds

	1949	1948	1947	1946
Jan.	76,348	85,432	101,776	84,555
Feb.	68,776	87,169	92,566	74,851
Mar.	70,173	96,344	94,530	85,244
Apr.	59,573	89,035	98,253	91,365
May	53,319	81,286	90,054	89,163
June	52,616	84,817	84,604	83,160
July	43,273	71,803	70,603	79,379
Aug.	58,055	81,976	75,060	93,303
Sept.	60,771	86,973	83,158	92,367
Oct.	.....	91,311	92,119	106,475
Nov.	.....	86,497	81,803	92,706
Dec.	.....	88,182	87,215	93,028

ANNUAL SHIPMENTS

1948	1,030,825	1945	1,008,000
1947	1,051,741	1944	1,446,200
1946	1,065,596	1943	1,522,000

U. S. Bureau of the Census • Estimated

Copper and Brass Mill Fabricator Statistics

(Summary of statistics which cover United States duty-free copper until Mar. 1, 1941; duty-paid foreign copper included thereafter; beginning January, 1947, copper from all sources, duty free. Figures given in net tons.)

End of period:	DELIVERIES Deliveries to Users (actual consump)	DELIVERIES Producer Deliveries to Fabricators	STOCKS Fabricators' Refined Stocks	STOCKS Less Working Stocks	STOCKS Visible Supplies	STOCKS Plus Undelivered Purchases	STOCKS Total Stocks and Purchases	Unfilled Orders
1949*	1,071,823	1,016,800	320,000	280,000	40,000	100,000	140,000	170,000
Jan.	109,551	94,070	364,656	295,135	69,521	82,042	151,563	300,967
Feb.	93,474	97,861	367,872	290,317	77,555	88,241	165,796	272,575
Mar.	89,834	113,154	387,871	290,565	97,306	85,945	183,251	244,064
April	65,461	76,134	396,454	286,064	110,390	35,855	146,245	215,997
May	61,383	32,566	367,034	277,392	89,642	30,391	120,033	195,056
June	71,124	45,653	341,313	277,777	63,536	26,328	89,864	180,172
July	61,220	45,316	325,409	278,242	47,169	46,740	93,909	209,972
Aug.	88,088	90,739	328,931	286,488	42,443	50,259	92,702	188,768
Sept.	114,760	103,115	316,415	281,130	35,285	61,196	96,481	180,097
Oct.	106,928	108,192	317,829	281,924	35,905	81,322	117,227	174,636
1948	1,394,307	1,344,445	379,346	295,958	83,388	81,496	164,884	315,944
Jan.	127,227	118,855	414,760	300,721	114,039	98,283	212,322	333,665
Feb.	115,238	106,823	406,029	297,451	108,578	97,065	205,643	302,103
Mar.	120,167	122,988	408,697	298,433	110,264	96,439	206,703	292,355
April	117,331	116,475	407,742	300,320	107,422	101,990	209,412	294,307
May	112,730	113,389	408,951	299,196	109,755	94,361	204,116	305,849
June	120,172	112,677	401,075	293,743	107,332	98,881	206,213	334,211
July	103,488	108,277	405,751	294,599	111,152	101,194	212,356	349,787
Aug.	115,036	107,496	398,211	292,981	105,230	116,935	221,165	346,564
Sept.	126,236	122,938	394,917	290,044	104,873	118,095	222,968	317,411
Oct.	126,700	112,580	381,198	295,960	85,238	89,980	175,218	296,028
Nov.	108,266	99,655	372,332	299,683	72,649	76,443	149,092	298,838
Dec.	101,716	102,292	379,346	295,958	83,388	81,496	164,884	315,944
1947	1,338,383	1,383,666	423,432	293,859	129,573	103,765	233,338	338,260
1946	1,231,225	1,260,921	411,013	286,418	124,595	59,421	184,016	526,648
1945	1,462,440	1,517,842	375,618	268,490	107,128	44,100	151,228	362,436
1944	1,656,052	1,636,295	334,017	289,160	44,857	53,538	98,395	285,654
1943	1,701,753	1,643,955	353,948	299,796	54,152	90,807	144,959	465,258
1942	1,517,983	1,635,236	414,668	340,547	74,121	135,481	209,602	613,005
1941	1,577,765	1,545,541	295,813	291,515	4,298	241,335	245,633	547,468
1940	959,607	1,001,886	339,376	240,740	98,636	326,269	424,905	414,892
1939	793,399	814,407	300,543	184,833	115,710	189,687	306,397	237,752
1938	526,743	481,807	323,439	182,465	140,974	112,254	253,228	177,286

Nonferrous Metals

LEAD—ANTIMONY—ZINC

METALWORKING FACTS AND FIGURES

U. S. Lead

Refiners' Stocks, Production, Shipments
Net Tons

	Stock at Beginning	PRODUCTION Primary	Secondary	Total	Total Supply	Domestic Shipments
1949*	40.647	535.000	16,000	551,000	591,647	370.000
Jan.	40.647	48,775	1,889	50.664	91,311	50,440
Feb.	38,656	42.254	2,497	44.751	83,407	41,652
Mar.	38,514	51,373	2,574	53.947	92,461	28,368
Apr.	56,737	48,957	1,193	50.150	106,887	16.743
May	72,347	51,206	399	51.605	123.952	19,792
June	94,132	45,455	974	46.429	140.561	30,017
July	100,117	38,332	950	39.282	139,399	34,894
Aug.	94,201	37,754	1,608	39,362	133.563	36,059
Sept.	76,782	34,928	996	35,924	112,706	29,566
Oct.	61,433	46,246	964	47,210	108,643	23.738
1948	21,787	511,356	33,913	545,269	567,056	522,999
1947	48,088	541,065	42,651	583,716	631,804	608,421
1946	45,682	396,686	17,215	413,903	459,585	411,433
1945	19,536	455,380	68,948	524,328	543,864	500,003
1944	33,090	475,994	62,624	538,618	571,708	552,063
1943	34,937	492,351	54,322	546,673	581,610	548,417

American Bureau of Metal Statistics

Antimony Imports

Metal imported for consumption in United States—Net Tons

Year	Antimony Ore Gross Weight	Sb Content	Needle or Liquidated Sb	Antimony Metal	Type Metal and Antimonial Lead†
1948	41,683	13,532	533	3,176	1,549
1947	28,525	9,282	17	5,879	187
1946	19,741	5,903	...	2,593	246
1945	49,385	22,643	...	627	1,380
1944	41,879	17,080	...	293	388

U. S. Department of Commerce.

† Estimated antimony content.

Slab Zinc

Net Tons

(Commencing with January, 1948, all regularly operating United States primary and secondary smelters are included. Production from foreign ores is included commencing with 1940)

	Stock Beginning	Production	SHIPMENTS Domestic	Export & Drawback	Gov't. Acc't.	Total	Unfilled Orders at End
1949*	20,848	860,000	640,000	59,000	89,000	788,000	27,000
Jan.	20,848	75,815	62,614	5,857	7,763	76,234	75,858
Feb.	20,429	69,193	60,827	3,497	4,198	68,522	87,898
Mar.	21,100	78,121	51,381	7,460	12,176	71,017	79,722
Apr.	28,204	75,921	35,948	8,438	8,757	53,143	65,713
May	50,982	77,537	35,564	5,731	11,394	52,689	58,644
June	75,830	73,989	44,820	14,055	8,025	66,900	42,705
July	82,919	74,569	62,443	3,111	6,526	72,080	53,423
Aug.	85,408	73,819	68,659	1,212	4,468	74,339	41,336
Sept.	84,888	70,392	60,220	3,830	6,027	70,077	35,009
Oct.	85,203	64,399	43,998	1,808	5,955	51,761	34,808
Nov.	97,841	65,055	64,034	1,429	8,414	73,877	29,166
1948	68,647	850,105	770,396	69,910	57,598	897,904	51,318
1947	175,800	848,027	698,281	117,305	140,230	955,816	59,705
1946	259,391	759,346	714,292	66,638	62,007	842,937	58,057
1945	237,520	799,520	762,925	9,422	5,302	777,649	27,092
1944	173,510	901,332	830,334	6,988	.....	837,322	21,332
1943	89,275	971,873	831,430	56,208	.....	887,638	44,914
1942	24,066	929,770	733,918	151,650	.....	885,568	52,752
1941	17,582	863,955	751,276	106,195	.....	857,471	87,666
1940	74,262	706,100	674,615	88,165	.....	762,780	125,132
1939	126,769	538,198	598,972	.....	.....	598,972	53,751
1938	65,333	456,990	395,534	20	.....	395,554	40,829
1937	44,955	589,619	569,241	.....	.....	569,241	48,339
1936	83,758	523,166	561,969	.....	.....	561,969	78,626
1935	118,005	431,499	465,687	59	.....	465,746	51,186
1934	105,560	366,933	352,515	148	.....	352,663	30,786
1933	124,856	324,705	343,762	239	.....	344,001	15,978
1932	129,842	213,531	218,347	170	.....	218,517	8,478
1931	143,618	300,738	314,473	41	.....	314,514	18,273
1930	75,430	504,463	436,079	196	.....	436,275	26,651
1929	46,430	631,601	596,249	6,352	.....	602,601	18,585

American Zinc Institute Inc.

* Estimated.

Antimony Production

Domestic mine production of ores and concentrates, Net Tons

Year	Gross Weight	Antimony Content Quantity	Average Per Cent
1948	16,239	6,489	40.0
1947	20,020	5,316	26.6
1946	13,962	2,505	17.9
1945	14,966	1,930	12.9
1944	13,501	4,735	35.1

U. S. Bureau of Mines

Antimony Consumption

Industrial use of primary antimony—Net Tons

PRODUCTS	1948	1947	1946
Ammunition	21	24	30
Antimonial Lead and Battery Metal	6,024	6,172	5,911
Bearing Metal and Bearings	1,803	2,056	2,886
Cable Covering	62	61	79
Castings	81	129	233
Collapsible Tubes and Foil	31	77	121
Sheet and Pipe	195	225	218
Solder	145	132	281
Type Metal	1,019	1,216	1,903
Nonmetal Products	6,074	6,555	5,853
Total	15,455	16,647	17,515

U. S. Bureau of Mines

Lead Die Castings

Shipments—Thousands of Pounds

	1949	1948	1947	1946
Jan.	1,019	1,303	1,195	838
Feb.	705	1,079	1,119	1,041
Mar.	418	1,482	1,234	1,271
Apr.	348	1,219	1,383	1,133
May	476	1,260	966	1,403
June	606	1,183	1,079	1,227
July	600	861	1,013	987
Aug.	979	1,120	1,000	1,264
Sept.	1,319	1,420	1,241	1,228
Oct.	....	1,366	1,393	1,260
Nov.	....	1,152	1,205	1,020
Dec.	....	1,432	1,308	856
Total	....	14,877	14,136	13,528

U. S. Bureau of the Census

Mine Production of Zinc

Net Tons

	1949	1948	1947	1946	1945
Jan....	52,036	48,068	55,036	51,870	56,745
Feb....	52,419	48,241	51,770	47,968	50,901
Mar....	60,980	54,989	55,874	51,177	56,344
Apr....	58,285	53,425	58,447	47,972	51,663
May...	54,791	51,927	59,098	48,655	54,084
June...	53,599	51,755	62,121	42,966	52,429
July...	40,064	47,095	47,719	33,737	47,686
Aug....	44,483	49,748	48,855	46,567	46,694
Sept....	42,193	52,581	47,608	49,030	47,664
Oct.....	.....	53,542	51,506	52,191	52,029
Nov....	.....	55,005	48,976	50,574	51,515
Dec....	.....	55,141	50,598	52,126	46,604
Mo.Avg.	.....	52,498	53,134	47,903	51,197

U. S. Bureau of Mines

Zinc and Zinc Alloy Castings

Shipments—Thousands of Pounds

	1949	1948	1947	1946
Jan.	33,205	36,149	37,218	24,010
Feb.	28,238	37,682	38,344	23,206
Mar.	28,721	41,521	41,343	27,074
Apr.	26,668	39,070	40,855	31,082
May	26,969	35,469	36,772	32,323
June	32,823	37,136	33,890	31,839
July	25,943	32,459	31,313	30,015
Aug.	35,020	37,519	28,137	34,637
Sept.	35,609	36,720	32,727	33,992
Oct.	.....	38,407	38,612	42,371
Nov.	.....	35,931	33,617	37,291
Dec.	.....	36,891	37,218	36,860
Total	.....	444,954	430,046	384,701

U. S. Bureau of the Census

CONSUMPTION OF LEAD IN U. S.—1949

Net Tons

Metal Products	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Ammunition	3,143	2,959	2,811	1,637	1,872	1,961	1,529	1,517	1,509
Bearing Metals	3,432	3,027	2,534	2,512	2,309	2,029	1,870	2,543	2,493
Brass & Bronze	1,573	1,342	1,192	1,050	934	991	922	1,249	1,243
Cable Covering	12,791	12,596	13,880	12,096	11,187	11,435	5,824	10,566	8,967
Calking Lead	3,942	2,149	2,034	1,445	2,061	1,863	3,068	2,968	2,784
Casting Metals	1,018	1,264	1,177	899	567	1,016	1,135	1,087	944
Collapsible Tubes	901	695	793	569	622	628	494	658	762
Foil	217	158	78	103	137	201	210	471	472
Pipes, Traps & Bends ..	2,921	2,293	1,951	1,755	1,692	2,235	2,267	3,084	2,887
Sheet Lead	2,857	3,125	2,805	1,969	1,594	1,996	2,032	2,169	2,135
Solder	5,103	4,670	5,028	4,053	4,239	4,986	4,970	6,600	5,985
Storage Batteries									
Antimonial Lead	11,162	8,612	7,781	6,714	9,078	11,137	13,974	21,089	20,435
Oxides	8,623	6,319	4,874	4,830	7,457	9,013	10,871	17,271	14,650
Terne Metal	320	215	204	144	263	102	144	353	416
Type Metal	2,447	2,070	2,229	1,716	1,507	1,591	1,472	1,452	1,399
Total Metal Products	60,450	51,494	49,371	41,492	45,519	51,184	50,782	73,077	67,081
Pigments	12,775	9,111	5,643	4,474	7,480	6,261	7,732	10,857	11,809
Chemicals	9,735	8,959	7,212	8,304	8,614	7,454	8,974	8,608	6,369
Miscellaneous Uses	1,950	1,763	1,992	1,625	1,801	1,449	1,258	1,703	1,600
Total Consumed	84,910	71,327	64,218	55,895	63,414	66,348	68,746	94,245	86,859

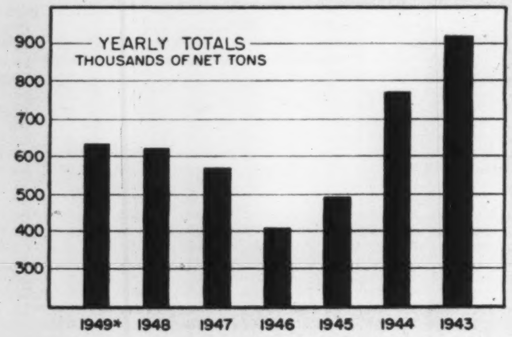
U. S. Bureau of Mines

* Estimated.

Nonferrous Metals

ALUMINUM—MAGNESIUM

PRIMARY ALUMINUM PRODUCTION



1949-1943 By Months—Net Tons

	1949	1948	1947	1946	1945	1944	1943
Jan.	53,356	48,767	50,045	24,750	48,650	54,750	60,650
Feb.	49,749	45,699	47,002	22,250	45,650	74,400	55,600
Mar.	54,852	51,874	53,032	26,000	53,100	80,200	64,600
Apr.	54,076	53,277	51,007	25,900	51,600	77,800	66,800
May	56,909	55,450	51,116	24,850	52,000	76,450	72,850
June	54,184	48,557	46,259	27,800	47,500	66,400	74,150
July	55,777	52,937	47,998	35,750	47,900	67,550	78,450
Aug.	52,005	54,953	47,054	39,850	45,800	61,650	81,350
Sept.	49,739	53,255	43,228	41,100	31,600	47,450	86,400
Oct.	45,790	54,526	43,959	45,000	25,000	48,400	94,050
Nov.	.....	50,714	43,461	46,300	20,800	44,450	91,350
Dec.	.....	53,474	47,589	50,700	24,000	46,850	93,600
Total	625,000*	623,456	571,750	409,630	495,060	776,446	920,179

Yearly totals reflect adjustments and in some instances vary slightly from the sums of monthly figures. U. S. Bureau of Mines.

Secondary Aluminum Production

Net Tons

Year	From New Scrap	From Old Scrap	As Metal	From Alloys, Scrap	Total
1948.........	191,129	95,648	2,384	284,393	286,777
1947.........	180,990	163,847	5,105	339,732	344,837
1946.........	187,538	90,535	2,075	275,998	278,073
1945.........	271,076	27,311	2,145	296,242	298,387
1944.........	302,746	22,899	2,336	323,309	325,645
1943.........	280,867	33,094	5,926	308,035	313,961
1942.........	154,831	41,633	14,104	184,388	198,492
1941.........	63,744	43,113	8,308	98,549	106,857
1940.........	34,556	45,806	5,620	74,742	80,362
1939.........	16,184	37,763	2,900	51,047	53,947

U. S. Bureau of Mines

Bauxite Production and Imports

Long Tons—Quarterly figures are preliminary and their sums differ slightly from final annual totals.

	—Mine Production (dried equiv.)—			Imports as Shipped	Total New Supply
	Arkansas	Ala., Ga., Va.	Total		
1949*	1,200,000	55,000	1,255,000	2,250,000	3,505,000
1st Qtr.	303,048	14,690	317,738	602,134	919,872
2nd Qtr.	320,000	12,553	332,553	514,161	846,714
1948	1,395,341	61,807	1,457,148	2,488,915	3,946,063
1st Qtr.	290,799	13,377	304,176	589,215	893,391
2nd Qtr.	348,143	19,830	367,973	604,337	972,310
3rd Qtr.	429,558	16,588	446,146	618,092	1,064,238
4th Qtr.	360,068	13,540	373,608	677,271	1,050,879
1947	1,153,563	48,492	1,202,055	1,821,580	3,023,635
1st Qtr.	312,577	13,917	326,494	432,748	759,242
2nd Qtr.	298,458	6,416	304,874	492,454	797,328
3rd Qtr.	269,853	16,125	285,978	509,577	795,555
4th Qtr.	282,550	15,412	297,962	386,801	684,763
1946	1,019,118	53,707	1,072,825	852,005	1,924,830
1945	910,049	70,960	981,009	739,581	1,720,590
1944	2,695,317	128,407	2,823,724	560,461	3,384,185
1943	6,036,490	196,393	6,232,883	1,547,854	7,780,737
1942	2,459,906	142,128†	2,602,034	884,217	3,486,251

†Includes Mississippi.

U. S. Bureau of Mines.

Aluminum Wrought Products

Producers' Shipments, Thousands of Pounds

Period	Total	Plate, Sheet, and Strip	Rolled Structural Shapes, Rod, Bar, Wire	Extruded Shapes, Tube Blooms, and Tubing	Powder, Flake, and Paste
1949*	1,185,000	824,000	205,000	140,500	15,500
January	119,285	90,165	13,375	14,237	1,508
February ...	110,034	80,699	14,607	13,828	900
March	125,428	92,435	16,103	15,745	1,145
April	105,735	73,066	18,075	13,692	902
May	89,029	56,866	19,112	12,055	996
June	80,674	48,074	20,176	11,246	1,178
July	71,730	42,822	18,122	9,525	1,261
August	80,201	49,339	19,677	9,805	1,380
September ..	95,803	65,347	18,450	10,516	1,490
October	106,233	75,918	16,772	11,846	1,697
1948	1,640,206	1,268,297	182,991	171,964	16,954
January	139,588	109,743	15,948	12,565	1,332
February ...	135,955	105,739	14,785	14,323	1,108
March	159,109	126,675	15,280	16,032	1,122
April	138,967	106,746	15,059	16,110	1,052
May	133,285	101,879	14,812	15,566	1,028
June	141,799	106,924	16,366	16,850	1,659
July	131,028	99,437	15,259	14,833	1,499
August	135,196	103,186	15,601	14,552	1,857
September ..	131,003	104,609	13,542	11,224	1,628
October	138,632	109,669	15,292	12,159	1,512
November ..	129,754	99,200	15,426	13,682	1,446
December ..	125,890	94,490	15,621	14,068	1,711
1947	1,406,832	1,111,159	157,379	121,728	16,566
January	126,437	96,480	13,584	14,325	2,048
February ...	123,959	96,659	13,720	11,749	1,831
March	116,454	91,080	11,950	11,378	2,046
April	110,714	83,379	15,053	10,333	1,949
May	106,779	81,720	13,477	10,121	1,461
June	91,901	70,532	11,571	8,677	921
July	91,403	72,101	10,943	7,337	1,022
August	101,790	82,476	10,679	7,702	933
September ..	119,315	98,059	11,926	8,354	976
October	146,860	120,385	14,820	10,704	951
November ..	133,154	107,987	14,159	9,885	1,123
December ..	138,066	110,301	15,497	10,963	1,305
1946 Total ...	1,140,849	866,982	130,638	126,078	17,151

U. S. Bureau of the Census

Aluminum and Aluminum-base Alloy Castings

Shipments—Thousands of Pounds

	1949	1948	1947	1946
Jan.	29,142	37,889	40,689	24,583
Feb.	27,228	37,963	37 767	23,582
Mar.	27,478	41,794	42,266	27,944
Apr.	23,801	38,269	41,669	29,703
May	21,392	33,868	37,400	31,208
June	23,261	35,822	32,986	30,855
July	18,621	28,944	30,197	31,159
Aug.	23,997	32,136	30,441	36,382
Sept.	27,559	35,877	35,877	34,563
Oct.	.....	35,542	40,532	43,007
Nov.	.....	34,550	34,683	38,229
Dec.	.....	31,836	37,489	37,496

YEARLY SHIPMENTS

1948.......	424,490	1945.......	395,007
1947.......	441,996	1944.......	514,400
1946.......	388,711	1943.......	459,535

U. S. Bureau of the Census

* Estimated

Magnesium Wrought Products

Shipments—Thousands of Pounds

	1949	1948	1947	1946	1945
Jan.	581	314	700	427	529
Feb.	636	413	752	415	571
Mar.	672	460	588	466	609
Apr.	537	516	449	483	554
May	756	448	420	448	737
June	752	526	290	554	583
July	748	205	265	571	506
Aug.	671	497	253	507	531
Sept.	724	707	247	656	316
Oct.	793	519	299	715	346
Nov.	...	532	269	764	353
Dec.	...	728	275	636	382
Year	...	5,865	4,807	6,642	6,017

U. S. Bureau of Mines

Magnesium and Magnesium-base Castings

Shipments—Thousands of Pounds

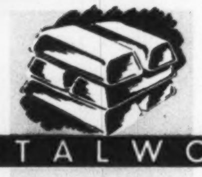
	1949	1948	1947	1946	1945
Jan.	822	659	864	453	†10,424
Feb.	813	655	768	497	†10,366
Mar.	879	704	717	627	†12,646
Apr.	726	673	684	607	†11,903
May	778	622	628	694	†12,134
June	799	709	613	756	†10,565
July	689	554	709	682	†9,838
Aug.	753	703	523	745	†4,960
Sept.	727	745	518	873	169
Oct.	...	708	616	988	251
Nov.	...	728	602	777	236
Dec.	...	754	669	773	261

YEARLY SHIPMENTS

1948.........	8,214	1945.......	83,753
1947.........	7,691	1944.......	201,487
1946.........	8,472	1943.......	143,326

† Includes incendiary bomb castings.

U. S. Bureau of the Census



Nonferrous Metals

TIN—MOLYBDENUM—MANGANESE—TUNGSTEN—SILVER

METALWORKING FACTS AND FIGURES

U. S. Tin Imports

Ore (Tin Content), and Metal (Bars, Blocks, Pigs, etc.) in Long Tons

	Ore	Metal
1949		
Jan.	3,977	587
Feb.	2,443	2,526
Mar.	3,174	8,795
Apr.	4,205	8,493
May	3,801	4,210
June	2,108	4,049
July	2,210	3,318
Aug.	2,332	6,434
1948		
Jan.	2,201	4,653
Feb.	3,668	1,539
Mar.	3,595	2,294
Apr.	2,137	3,318
May	1,335	6,026
June	5,194	4,979
July	3,891	2,750
Aug.	4,154	4,188
Sept.	1,931	4,280
Oct.	1,884	5,625
Nov.	2,835	2,433
Dec.	4,194	7,111
MONTHLY AVERAGES		
1949*	3,000	4,800
1948	3,085	4,100
1947	2,543	2,075
1946	3,173	1,293
1945	2,794	708
1944	2,962	1,112
1943	1,822	993
1942	2,411	2,229
1941	2,389	11,739
1940	250	10,401
1939	42	5,842

Office of Domestic Commerce

Silver Production

(Thousands of ounces; commercial bars, 0.999 fine, and other refined forms.)

	Domestic†	Foreign	Total
1949*	33,000	30,000	63,000
Jan.	2,761	2,891	5,652
Feb.	2,821	1,846	4,667
Mar.	2,743	3,273	6,016
Apr.	3,341	1,569	4,910
May	3,614	2,454	6,068
June	2,724	2,476	5,200
July	2,349	2,185	4,534
Aug.	2,909	2,649	5,558
Sept.	2,167	2,925	5,092
1948	36,111	37,680	73,791
Jan.	3,938	2,620	6,558
Feb.	2,070	3,202	5,272
Mar.	3,383	2,935	6,318
Apr.	3,216	2,955	6,171
May	3,253	3,508	6,761
June	3,085	2,704	5,789
July	2,721	3,270	5,991
Aug.	2,327	1,877	4,204
Sept.	3,466	4,041	7,507
Oct.	2,957	3,227	6,184
Nov.	3,414	3,280	6,694
Dec.	2,281	4,061	6,342
1947	36,053	39,645	75,698
1946	21,377	30,371	51,748
1945	29,332	38,786	68,118
1944	37,370	39,341	76,711
1943	44,812	51,295	96,107
1942	54,486	59,966	114,452

† Includes purchases of crude silver by the United States Mint.
American Bureau of Metal Statistics.

U. S. Tin Consumption and Stocks

Long Tons

	Consumption			
	Primary	Secondary	Total	Stocks
1949*	53,000	21,000	74,000	75,000
Jan.	4,614	2,094	6,708	64,939
Feb.	4,455	1,805	6,260	70,404
Mar.	4,635	1,839	6,474	72,522
Apr.	4,274	1,581	5,855	69,982
May	4,124	1,661	5,785	65,498
June	4,159	1,442	5,601	71,136
1948	64,064	26,349	90,409	63,871
1947	63,078	24,103	87,181	66,727
1946	54,627	26,316	80,943	68,148
1945	55,642	27,941	83,583	76,170
1944	59,156	30,813	89,969	88,148
1943	46,253	34,077	80,330	104,744
1942	56,288	29,399	85,687	126,125
1941	103,086	31,609	134,695	139,321
1940	72,324	24,830	97,154	93,202
1939	66,583	15,845	82,428	36,177
1938	48,116	11,658	59,774	26,015
1937	72,928	17,202	90,130	30,250

International Tin Study Group

World Tin

Long Tons

	Production	Consumption	Stocks
1949 (9 mos.)	126,600	91,600	128,400
Jan.	14,700	10,500	131,200
Feb.	12,900	10,300	133,700
Mar.	14,600	10,700	133,400
Apr.	13,200	9,900	134,200
May	14,800	9,700	134,500
June	14,000	10,000	139,300
July	14,000	9,700	138,400
Aug.	13,900	10,400	130,300
Sept.	14,500	10,400	128,400
1948	157,500	138,900	133,600
1947	124,000	136,900	131,200
1946	98,500	111,800	160,400
1945	89,000	97,700	173,300
1944	92,000	101,100	152,700
1943	108,500	101,500	160,100
1942	101,500	114,900	165,300
1941	215,000	169,600	180,600
1940	221,000	157,900	123,700
1939	170,500	158,100	73,800

International Tin Study Group. Figures are partly estimated and include substantial revisions from previously reported totals. Stocks do not include those of consumers.

Tungsten

U. S. Mines—Pounds

	Production	Shipments
1949*	3,000,000	2,800,000
1st Qtr.	891,444	739,169
2nd Qtr.	873,996	983,444
3rd Qtr.	556,756	......
1948	4,006,741	3,811,639
1947	3,026,470	2,944,622
1946	4,671,042	4,942,282
1945	5,388,639	5,266,818
1944	9,764,647	9,786,537

U. S. Bureau of Mines

U. S. Tin Smelter Output

Long Tons

	1949	1948	1947	1946	1945
Jan.	3,257	3,172	3,024	3,812	3,114
Feb.	3,254	2,800	2,815	3,823	3,162
Mar.	3,104	2,602	2,877	3,881	3,310
Apr.	2,851	2,906	2,816	3,891	3,407
May	3,007	3,310	3,112	3,904	3,451
June	3,006	3,650	2,712	3,856	3,502
July	2,910	3,509	2,517	3,853	3,548
Aug.	3,005	3,509	2,237	3,672	2,912
Sept.	2,910	2,859	2,356	3,323	3,323
Oct.	2,964	2,300	3,026	3,125	3,558
Nov.	2,994	2,907	2,759	3,119	3,628
Dec.	2,900*	3,153	3,041	3,209	3,676
Total	36,162*	36,677	33,292	43,468	40,591

Office of Domestic Commerce

RFC Tin Stockpile

Long Tons

	Receipts	Allocations	Stocks
1949*	100,000	41,000	24,000
Jan.	3,842	4,374	23,929
Feb.	5,792	3,837	25,199
Mar.	11,896	3,295	27,903
Apr.	11,364	2,485	31,116
May	7,238	2,296	30,550
June	7,086	2,863	33,704
July	7,149	3,966	31,146
Aug.	8,185	4,418	21,703
Sept.	9,479	4,169	20,873
Oct.	10,188	3,918	22,403
Nov.	7,881	3,148	23,129
1948	85,631	62,411	24,322
Jan.	7,825	5,233	27,674
Feb.	5,269	5,083	27,086
Mar.	4,056	5,175	26,815
Apr.	6,113	5,010	27,956
May	9,609	5,055	32,437
June	8,318	4,994	35,701
July	6,332	4,821	37,118
Aug.	7,692	4,940	39,911
Sept.	7,457	4,892	41,575
Oct.	7,429	5,056	44,814
Nov.	7,369	7,379	46,454
Dec.	8,162	4,773	24,322
1947 (4 mos.)			
Sept.	8,120	4,875	16,356
Oct.	8,967	4,690	21,309
Nov.	5,362	5,673	20,542
Dec.	9,466	5,716	24,555

Office of Domestic Commerce

Molybdenum Products

Comprises ferromolybdenum, molybdic oxide, and molybdenum salts and metal
Pounds

	Production	Shipments†	Stocks
1949*	21,800,000	16,500,000	16,106,300
1st 6 mos.	11,819,100	8,559,600	10,806,300
1st Qtr.	6,397,400	5,229,900	8,714,300
2nd Qtr.	5,421,700	3,329,700	10,806,300
1948‡	24,445,300	25,024,700	7,546,800
1st Qtr.	4,921,700	5,616,100	7,431,800
2nd Qtr.	5,819,400	5,875,400	7,375,800
3rd Qtr.	6,526,300	5,591,000	8,311,100
4th Qtr.	7,332,200	8,090,200	7,553,100
1947	20,659,700	20,744,900	8,126,200
1946	15,039,100	16,944,100	8,211,400

† Including exports. ‡ Revised.
U. S. Bureau of Mines

Manganese

(Supplies for United States Consumption, net tons.)

	Domestic Mine Shipments	General Imports		Exports		Net Supply
		Ore	Ferro-manganese†	Ore	Ferro-manganese†	
1949*	106,000	1,400,000	121,000	4,500	12,500	1,610,000
1st Qtr.	13,700	273,666	64,725	1,478	7,251	343,362
2nd Qtr.	31,600	335,865	53,036	1,026	1,990	417,485
3rd Qtr.	40,722	424,637	1,660	1,153	1,452	464,414
1948	130,000	1,256,646	189,370	9,236	37,974	1,528,806
1st Qtr.	16,400	344,451	43,954	1,999	20,853	381,953
2nd Qtr.	40,900	272,975	47,728	2,743	2,129	356,731
3rd Qtr.	44,300	279,650	47,192	2,033	4,963	364,146
4th Qtr.	28,400	359,570	50,496	2,461	10,029	425,976
1947	131,627	1,541,818	156,760	10,075	38,884	1,781,246
1946	143,635	1,749,223	61,947	19,137	5,690	1,929,978
1945	182,337	1,461,945	68,484	24,667	1,611	1,686,488

† Expressed in terms of ore

U. S. Bureau of Mines

Molybdenum Concentrates

Pounds

	Production	Shipments†	Consumption	Stocks
1949*	22,500,000	25,000,000	20,000,000	18,000,000
1st 6 mos.	11,084,000	14,155,200	11,921,000	17,963,300
1st Qtr.	5,270,700	6,371,400	6,363,200	19,220,600
2nd Qtr.	5,813,300	7,783,800	5,557,800	17,963,300
1948‡	26,706,000	29,669,000	25,156,000	21,205,800
1st Qtr.	6,865,400	5,224,000	4,951,300	24,954,400
2nd Qtr.	7,538,300	7,306,400	5,898,800	25,640,200
3rd Qtr.	7,670,500	7,382,200	6,708,000	25,988,000
4th Qtr.	4,631,400	9,756,200	7,591,200	21,218,600
1947	27,047,000	22,189,800	20,221,000	23,660,500
1946	18,218,000	16,218,600	14,994,000	19,274,700

† Including exports, plus concentrates converted to oxide at Miami, Ariz., and Langeloth, Pa. ‡ Revised.
U. S. Bureau of Mines

* Estimated

Appliances

Standard-Size Ironers

Factory Sales—Units

	1949	1948	1947
Jan.	28,300	40,192	31,509
Feb.	28,400	51,651	39,239
Mar.	23,800	53,686	42,442
Apr.	18,100	47,319	51,409
May	19,500	44,954	51,685
June	21,100	32,767	52,025
July	17,700	26,679	41,911
Aug.	32,300	35,203	47,577
Sept.	27,700	37,308	53,277
Oct.	36,045	38,517	58,605
Nov.	.....	42,000	58,980
Dec.	.....	26,000	70,599

YEARLY TOTALS

1948	476,276	1942*	66,090
1947	599,258	1941	259,668
1946	124,616	1940	175,466
1945–43*	None	1939	127,093

---

* Civilian production stopped from mid-1942 through 1945.

American Washer & Ironer Manufacturers' Association.

Electric Flat Irons

Sales

	1949	1948
January	$1,108,872	$1,922,156
February	2,742,607	2,979,783
March	2,127,391	2,346,511
April	833,086	1,458,062
May	1,351,914	1,958,910
June	1,295,321	1,316,418
July	1,924,226	1,447,092
August	2,610,425	2,679,644
September	2,381,801	3,102,216
October	2,068,588	2,011,897
November	....	2,478,261
December	....	2,594,878

YEARLY TOTALS

1948	$26,295,828	1942—1945	None
1947	34,074,725	1941	9,063,700
1946	19,445,777	1940	6,652,692
1939	5,697,786		

National Electrical Manufacturers Association

Radio, Television Receivers

Number Produced

1949	TV	FM-AM	AM
Jan.	121,238	147,733	561,900
Feb.	118,938	98,969	498,631
Mar.	182,361	71,216	607,570
Apr.	166,536	37,563	468,906
May	163,262	25,388	449,128
June	160,736	40,512	471,342
July	79,531	23,843	318,104
Aug.	185,706	64,179	559,076
Sept.	224,532	70,936	461,532
Oct.	304,773	83,013	* 587,267

1948	TV	FM-AM	AM
Jan.	30,001	136,015	1,173,240
Feb.	35,889	140,629	1,203,087
Mar.	52,137	161,185	1,420,113
Apr.	46,339	90,635	1,045,499
May	50,177	76,435	970,168
June	64,353	90,414	959,103
July	56,089	74,988	552,361
Aug.	64,953	110,879	759,165
Sept.	88,195	171,753	1,020,498
Oct.	95,216	170,086	869,076
Nov.	122,304	166,701	827,122
Dec.	161,179	200,326	876,315

YEARLY TOTALS—ALL SETS

1948	14,132,625	1937	8,083,144
1947	16,342,002	1936	8,248,755
1946	13,326,985	1935	6,030,508
1945†	*300,000	1934	4,478,967
1942†	4,306,984	1933	4,157,045
1941	13,642,334	1932	2,446,143
1940	11,831,187	1931	3,593,998
1939	10,762,631	1930	3,788,961
1938	7,141,811		

---

† Civilian production was curtailed from April, 1942, to December, 1945.

Radio Manufacturers Association

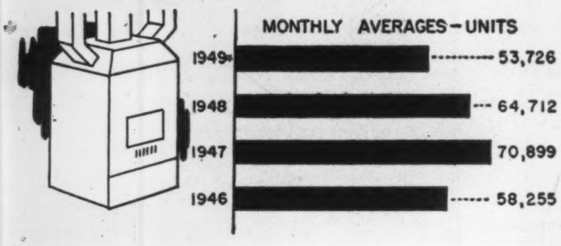
Steel Kitchen Cabinets—Factory Sales

	1949	1948	1947	1938
Total Cabinets	2,450,000*	3,500,000	2,790,000	Not available
Retail Value	$96,600,000*	$138,000,000	$104,600,000	$15,000,000
Undersink Cabinets	Not available	913,500	1,015,000	Not available
Retail Value	Not available	$56,371,000	$56,600,000	Not available
All Other Cabinets	Not available	2,586,500	1,775,000	Not available
Retail Value	Not available	$81,629,000	$48,000,000	Not available

---

Steel Kitchen Cabinet Institute

WARM AIR FURNACES



Shipments

	1949 Number of units	1949 Value, in dollars	1948 Number of units	1948 Value, in dollars
Jan.	31,855	5,848,806	46 558	8,008,641
Feb.	33,125	5,927,545	36,345	6,017,970
Mar.	41,376	7,087,524	39,297	6,849,001
Apr.	34,595	6,172,218	45,597	7,785,652
May	42,427	7,581,470	55,473	9,289,770
June	55,857	10,151,653	64,724	10,893,354
July	48,551	8,716,673	57,292	10,095,721
Aug.	84,250	15,175,740	92 011	15,904,370
Sept.	111,500	19,576,000	103,566	18,345,373
Oct.	......	....	107,024	20,109,273
Nov.	......	....	77,498	14,062,537
Dec.	......	....	51,163	9,575,270

YEARLY TOTALS

	Number of units	Value, in dollars		Number of Units	Value, in dollars
1948	776,548	136,936,932	1945	372,974	37,938,586
1947	850,783	141,943,102	1944	281,160	not available
1946	699,058	88,016,228			

U. S. Bureau of the Census

*Estimated

Gas Water Heaters

Shipments—Underfired and Sidearm Types

	1949 Units	1949 Value	1948 Units	1948 Value
Jan.	105,054	$4,912,762	145,456	$6,133,144
Feb.	97,210	4,531,839	130,668	5,708,996
Mar.	121,119	5,754,485	150,085	6,653,160
Apr.	126,996	6,050,309	152,564	6,669,490
May	134,639	6,362,775	137,496	6,201,346
June	148,020	6,955,048	145,068	6,509,435
July	128,625	5,656,046	140,614	6,198,725
Aug.	165,791	5,712,003	183,905	8,084,702
Sept.	165,772	7,135,000	171,350	7,691,968
Oct.	......	....	146,697	6,884,316
Nov.	......	....	124,516	5,690,307
Dec.	......	....	101,912	4,609,241

YEARLY TOTALS

	1948	1947	1946
Units	1,730,331	2,056,536	1,742,664
Value	$77,034,830	$86,377,903	$55,270,837

U. S. Bureau of the Census

Plumbing Fixtures

Shipments—Value in Dollars

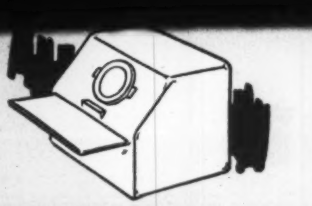
Vitreous China and Glazed Earthenware

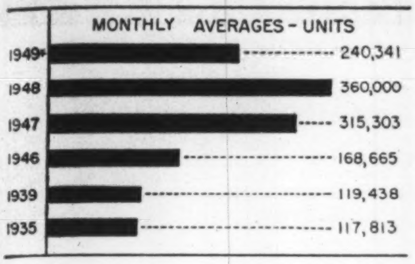
Qtr.	1949	1948	1947	1946
1st	$20,319,374	$17,975,992	$13,951,638	$10,908,773
2nd	17,546,600	19,398,044	14,025,345	11,770,019
3rd	18,448,505	21,458,998	14,776,298	11,588,395
4th	....	25,167,893	18,001,015	13,443,593
Total	....	$84,009,927	$60,754,296	$47,710,780

Metal—Exclusive of Fittings

Qtr.	1949	1948	1947	1946
1st	$27,918,544	$41,086,155	$28,122,957	$10,297,910
2nd	28,787,421	40,850,326	29,861,829	15,724,940
3rd	39,232,747	41,188,959	28,904,143	20,019,599
4th	....	48,037,997	39,315,659	26,429,280
Total	....	$171,163,437	$126,204,588	$72,471,729

U. S. Bureau of the Census





WASHERS

Sales Billed—Units

	1949	1948	1947
Jan. ...	172,400	360,445	259,233
Feb. ...	201,300	367,909	255,611
Mar. ..	242,500	408,512	290,397
Apr. ...	192,500	402,257	320,969
May ...	211,700	377,895	313,724
June ..	260,700	392,496	314,705
July ...	200,900	326,181	281,826
Aug. ..	323,789	362,169	279,229
Sept. ..	357,281	433,919	354,094
Oct. ...	333,728	382,400	397,113
Nov. ..	......	319,300	365,579
Dec. ...	......	183,700	351,152

MONTHLY AVERAGES

1948....	360,000	1940....	129,389
1947....	315,303	1939....	119,438
1946....	168,665	1938....	94,801
1945–43†	None	1937....	136,835
1942‡...	80,233	1936....	144,095
1941....	163,324	1935....	117,813

---

† Civilian production curtailed from July, 1942, to December, 1945.

‡ January-June, 1942, average.

American Washer & Ironer Manufacturers' Association

Electric Roasters and Broilers

Sales

	1949	1948
January	$580,697	$728,177
February	804,310	876,388
March	433,645	972,708
April	221,666	896,981
May	188,474	1,184,672
June	327,169	1,008,299
July	223,284	636,329
August	395,956	968,067
September	797,027	1,102,181
October	891,853	920,291
November	......	1,345,328
December	......	1,406,986

YEARLY TOTALS

1948.....	$12,046,407	1942–1945	None
1947.....	6,430,055	1941.....	3,457,358
1946.....	2,177,801	1940.....	2,433,768
1939.....	1,997,397		

National Electrical Manufacturers Association

Electric Water Heaters

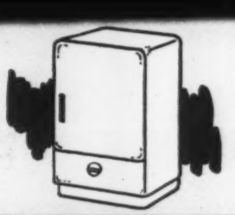
Unit Sales of Storage Tank Type

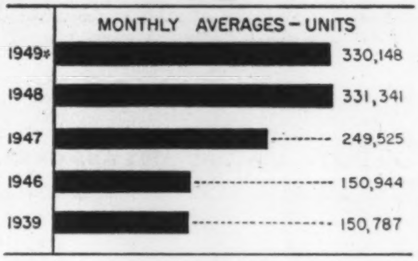
	1949	1948
January	31,576	53,996
February	39,683	55,573
March	40,529	64,768
April	38,248	58,294
May	43,782	60,985
June	48,759	72,610
July	40,118	57,911
August	45,778	62,891
September	50,790	70,575
October	50,383	58,974
November	.....	52,071
December	.....	37,741

YEARLY TOTALS

1948	706,389	1943	24,720
1947	817,717	1942	80,986
1946	399,826	1941	177,042
1945	129,722	1940	98,006
1944	31,527	1939	80,777

National Electrical Manufacturers Association





ELECTRIC REFRIGERATORS

Domestic Sales—Units

	1949	1948	1947
Jan. ...	380,853	[illegible],121	196,855
Feb. ...	337,424	281,580	169,450
Mar. ..	369,216	339,109	230,672
Apr. ..	324,370	330,720	250,623
May ...	330,753	317,763	263,785
June ..	296,199	373,115	273,531
July ...	315,444	351,094	259,075
Aug. ..	307,622	281,345	199,001
Sept. ..	309,429	344,280	268,628
Oct. ...	252,580	380,854	294,659
Nov. ..	......	374,470	272,072
Dec. ...	......	330,660	315,946

YEARLY TOTALS

1948...	3,976,091	1943...	156,697
1947...	2,994,297	1942...	378,725
1946...	1,811,326	1941...	3,303,572
1945...	267,061	1940...	2,528,566
1944...	40,034	1939...	1,809,445

National Electrical Manufacturers Assn.

Electric Heating Appliances

Sales

	1949	1948
January	$4,268,686	$4,406,456
February	4,263,715	4,817,764
March	4,855,942	5,153,837
April	3,023,105	4,736,023
May	2,717,828	4,737,331
June	2,473,164	4,637,928
July	2,075,242	3,691,947
August	3,608,809	4,859,789
September	5,825,514	6,070,782
October	6,128,164	6,188,442
November	....	6,755,268
December	....	5,712,830

YEARLY TOTALS

1948.....	$61,768,397	1942–1945	None
1947.....	44,703,330	1911.....	8,497,881
1946.....	24,515,895	1940.....	6,869,832
1939.....	5,999,386		

National Electrical Manufacturers Association

Standard Vacuum Cleaners

Sales Billed—Units

	1949	1948	1947
Jan.	228,769	304,273	258,846
Feb.	241,267	311,448	272,907
Mar.	309,897	355,415	314,852
Apr.	252,656	306,588	335,368
May	222,850	276,657	319,781
June	207,354	256,071	327,250
July	161,920	229,537	282,165
Aug.	219,909	237,202	280,366
Sept.	250,036	280,084	326,882
Oct.	272,520	281,573	358,546
Nov.	253,516	255,080	350,470
Dec.	......	274,180	373,254

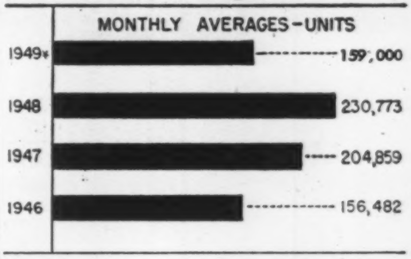
MONTHLY AVERAGES

1948......	280,096	1940......	111,716
1947......	316,724	1939......	90,384
1946......	190,787	1938......	80,584
1945–43†..	None	1937......	100,849
1942......	48,297	1936......	90,388
1941......	139,177	1935......	70,842

---

† Civilian production curtailed from January, 1943, to December, 1945.

Vacuum Cleaner Manufacturers Association



HOUSEHOLD GAS RANGES

Shipments—Units

	1949	1948	1947
Jan.	107,148	210,865	193,036
Feb. ...	118,171	223,756	191,334
Mar. ..	152,217	252,036	200,691
Apr. ...	150,737	247,403	205,310
May ...	152,382	252,929	199,098
June ..	163,115	259,675	204,015
July ...	126,619	201,532	181,103
Aug. ..	207,521	248,663	187,719
Sept. ..	229,244	260,508	212,806
Oct. ...	......	259,513	261,221
Nov. ...	......	215,715	210,894
Dec. ...	......	136,683	211,078

MONTHLY AVERAGES

1949* ..	159,000	1945 ...	84,872
1948 ...	230,773	1944 ...	54,405
1947 ...	204,859	1943 ...	36,235
1946 ...	156,482		

U. S. Bureau of the Census

Domestic Heating Stoves

Shipments—1949

	Coal, Wood	Gas	Oil	Total
January ..	24,114	40,076	61,373	125,563
February ..	15,102	32,986	50,712	98,800
March	11,107	42,038	59,067	112,212
April	12,986	34,354	41,785	89,125
May	17,716	45,821	36,154	99,691
June	42,249	62,692	82,685	187,626
July	75,257	104,603	108,242	288,102
August	146,962	220,861	195,871	563,694
September .	213,955	263,859	257,161	734,975

MONTHLY AVERAGES

1948	100,301	173,536	161,641	435,478
1947	108,804	218,091	201,018	527,913
1946	135,609	104,854	109,921	350,384
1945	135,726	62,133	48,260	246,119
1944	132,514	49,987	28,068	210,569
1943†	169,063	44,270	18,529	231,862

† Average for four months, Sept.-Dec.

U. S. Bureau of the Census

Household Electric Ranges

Domestic Sales—Units

	1949	1948	1947
Jan.	106,473	103,585	54,436
Feb.	87,370	103,506	60,568
Mar.	87,543	127,161	78,517
Apr.	59,894	104,677	81,731
May	52,286	98,983	87,637
June	68,107	123,300	96,271
July	62,402	83,485	78,749
Aug.	66,222	116,107	67,891
Sept.	91,073	128,829	99,519
Oct.	72,672	122,516	109,367
Nov.	......	123,661	93,890
Dec.	......	105,387	107,960

YEARLY TOTALS

1948......	1,341,497	1913......	8,480
1947......	1,016,536	1942......	161,312
1946......	542,168	1941......	683,859
1945......	146,046	1940......	404,239
1944......	42,712	1939......	296,846

National Electrical Manufacturers Association

Transportation

METALWORKING FACTS AND FIGURES

AUTOMOBILE PRODUCTION UNITED STATES AND CANADA

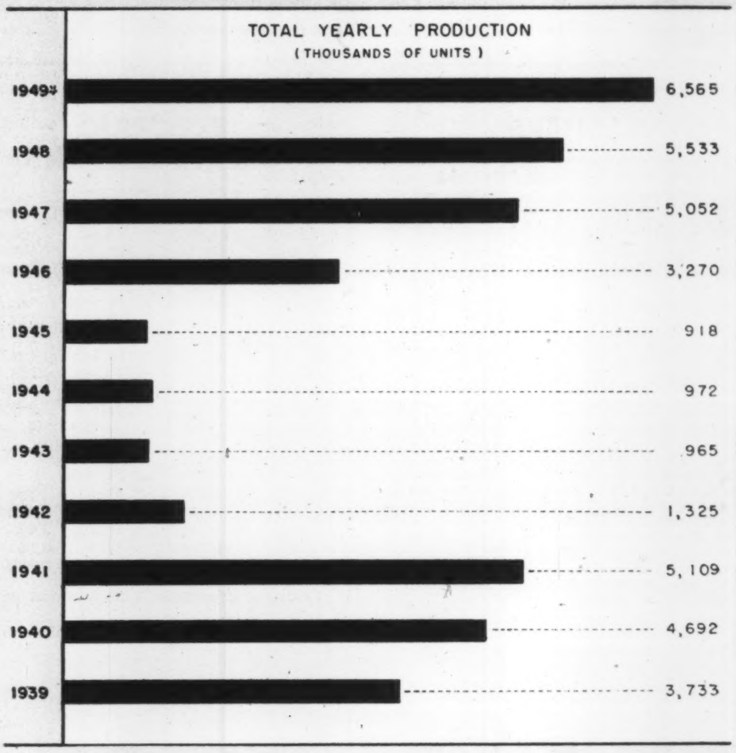
1949	Passenger Cars	Trucks	Total
Jan.	338,530	120,730	459,260
Feb.	337,181	111,628	448,809
Mar.	419,541	124,386	543,927
Apr.	451,221	114,190	565,411
May	410,487	94,591	505,078
June	519,255	114,871	634,126
July	499,300	104,702	604,002
Aug.	575,331	109,625	684,956
Sept.	556,998	94,861	651,859
Oct.	507,581	89,416	596,997
Nov.	380,343	75,977	456,320
Dec.	......	......	......

1948	Passenger Cars	Trucks	Total
Jan.	328,148	114,782	442,930
Feb.	284,930	115,647	400,577
Mar.	364,953	150,270	515,223
Apr.	318,387	142,577	460,964
May	235,752	119,759	355,511
June	328,755	130,205	458,960
July	367,108	120,658	487,766
Aug.	356,193	120,401	476,594
Sept.	314,547	116,943	431,490
Oct.	393,634	112,017	505,651
Nov.	379,220	117,528	496,748
Dec.	388,192	112,845	501,037

Annual Production

Year	Passenger Cars	Trucks	Total
1949* ...	5,328,000	1,237,000	6,565,000
1948	4,059,819	1,473,632	5,533,451
1947	3,723,233	1,329,290	5,052,523
1946	2,247,795	1,021,963	3,269,758
1945	85,654	832,017	917,671
1944	......	972,000	972,000
1943	......	965,400	965,400
1942	218,872	1,106,153	1,325,025
1941	3,838,345	1,270,647	5,108,992
1940	3,802,239	890,128	4,692,367
1939	2,965,165	757,553	3,732,718

Ward's Automotive Reports



U. S. Bus Production

	1949	1948	1947
January	658	1,382	1,273
February	418	1,101	1,303
March	545	1,430	1,421
April	514	1,056	1,650
May	564	1,288	1,853
June	632	1,068	1,628
July	439	1,012	1,806
August	444	771	1,765
September	298	1,143	1,607
October	322	679	1,667
November	...	545	1,416
December	...	824	1,721

YEARLY TOTALS

1948	12,299	1944	5,799
1947	19,110	1943	1,613
1946	10,091	1942	8,337
1945	9,500	1941	7,626
1940	6,147		

Automobile Manufacturers Association

Aircraft Shipments

Airframe Weight—Thousands of Pounds

1949	Military	Civil	Total
January	2,000.4	280.7	2,281.1
February ...	2,577.9	777.7	3,355.6
March	3,220.9	716.6	3,937.5
April	1,784.5	575.7	2,360.2
May	985.0	451.7	1,436.7
June	2,460.7	537.9	2,998.6
July	2,817.2	478.4	3,295.6
August	3,410.9	506.0	3,916.9
September ...	2,308.1	676.0	2,984.1
October	.....	....	.....
November ...	.....	....	.....
December ...	.....	....	.....

U. S. Bureau of the Census

* Estimated

New Transit Equipment Delivered

	Surface Cars	Subway & Elevated Cars	Trolley Coaches	Motor Busses	Total
1948 ..	478	206	1,430	7,009	9,123
1947 ..	626	2	955	12,029	13,612
1946 ..	421	...	266	6,463	7,150
1945 ..	332	...	161	4,441	4,934
1944 ..	284	...	55	3,807	4,146
1943 ..	32	...	117	1,251	1,400
1942 ..	284	...	336	7,200	7,820
1941 ..	462	...	411	5,600	6,473
1940 ..	463	15	310	3,984	4,772
1939 ..	371	150	587	3,918	5,026

American Transit Association

Batteries Shipped

Automotive Replacement Only—Thousands

	1949	1948	1947
January	1,243	2,394	1,509
February	826	2,254	1,601
March	560	1,679	1,798
April	499	1,211	1,868
May	685	1,027	1,873
June	1,059	1,200	1,737
July	1,637	1,506	1,433
August	2,648	2,519	2,073
September	2,786	2,643	2,415
October	2,574	2,845	2,854
November	....	2,541	2,683
December	....	1,906	2,597

MONTHLY AVERAGES

1948	1,977	1943	1,417
1947	2,037	1942	1,266
1946	1,460	1941	1,327
1945	1,463	1940	1,195
1944	1,593	1939	1,118

Association of Battery Manufacturers Inc.

Truck Trailers

	Production	—Shipments—	
1949	Units	Units	Value
Jan.	2,766	2,566	$8,983,900
Feb.	2,296	2,378	8,054,369
Mar.	2,634	2,822	9,900,390
Apr.	2,760	2,869	9,936,183
May	2,752	2,541	8,992,275
June	2,817	2,711	9,362,366
July	2,197	2,139	7,778,601
Aug.	2,601	2,609	9,296,552
Sept.	....	....	....
Oct.	....	....	....
Nov.	....	....	....
Dec.	....	....	....

YEARLY TOTALS

1948	44,443	46,930	$139,978,652
1947	53,096	55,372	138,383,093
1946	76,234	73,001	151,384,063

PRODUCTION, UNITS

"C"—Civilian "M"—Military

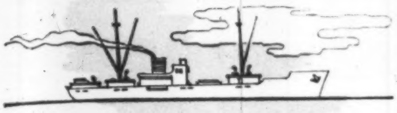
1945	33,266-C 83,967-M	1942	8,408-C 71,520-M
1944	24,092-C 185,349-M	1941	41,869
		1940	27,118
1943	8,054-C 188,811-M	1939	24,182
		1937	21,747
		1935	18,898

U. S. Bureau of the Census

Bicycles Shipped

1949*	1,600,000	1942-1945	None
1948	2,750,000	1941	1,830,000
1947	2,750,000	1940	1,300,000
1946	1,650,000	1939	1,220,000

Bicycle Mfrs. Assn. of America



Merchant Ship Construction

In Private U. S. Yards†

Year	No.	Gross Tonnage	Year	No.	Gross Tonnage
1948..	29	164,586	1938..	26	185,658
1947..	50	286,473	1937..	15	121,852
1946..	88	672,554	1936..	8	63,428
1945..	1,067	7,663,362	1935..	2	19,022
1944..	1,463	11,404,404	1934..	2	9,544
1943..	1,661	12,499,873	1933..	4	49,527
1942..	724	5,392,953	1932..	15	145,470
1941..	95	749,105	1931..	14	150,949
1940..	53	444,727	1930..	16	151,208
1939..	28	241,052	1929..	7	57,395

† On Jan. 1, 1949, 78 vessels aggregating 1,203,753 gross tons were under construction, compared with 32 vessels aggregating 209,750 tons on Jan. 1, 1948.

Shipbuilders Council of America

Finished Steel Consumption by U. S. Shipbuilders

Year	Net Tons	Per cent Total Output
1948	79,596	0.1
1947	337,961	0.5
1946	283,803	0.6
1945	2,719,000	4.8
1944	10,287,000	16.0
1943	11,509,000	19.2
1942	9,440,000	15.6
1941	2,733,000	4.4
1940	940,000	2.1
1939	518,000	1.3
1938	390,000	1.7
1937	391,000	0.9
1936	288,000	0.8
1935	207,000	0.8
1934	233,000	1.1
1933	115,000	0.6
1932	102,000	0.9
1931	224,000	1.0
1930	371,000	1.1
1929	346,000	0.8

Shipbuilders Council of America and American Iron & Steel Institute

Naval Shipbuilding

1948 Deliveries from Private Yards

Type	No.	Displacement Tonnage
Heavy Cruiser	1	17,000
Light Cruiser	1	14,700
Total	2	31,700

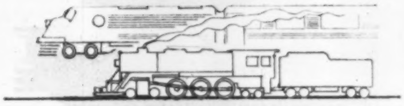
Private Yards' Naval Backlog

Jan. 1, 1949†

Large Cruiser	1	27,500
Heavy Cruisers	2	34,000
Light Cruiser	1	14,700
Destroyers	5	17,025
Hunter Killer Destroyers..	2	4,850
Destroyer Escorts	2	4,850
Task Fleet Command Ship	1	13,600
Hunter Killer Ship	1	6,000
Submarines	3	4,710
Anti-Submarine Submarines	2	1,500
Total	20	128,735

† Vessels contracted for with private yards in 1948 totaled 14 vessels of 110,260 displacement tons. Included in this total was the Navy's 65,000-ton super-carrier on which construction was stopped. Although the carrier was part of the private yards' backlog on Jan. 1, 1949, it is not included in the above table.

Shipbuilders Council of America



Diesel and Electric Locomotives

Unfilled Orders†

	1949	1948	1947	Monthly	Avgs.
				1949*	..1,046
Jan. ...	1,490	1,417	586	1948...	1,505
Feb. ...	1,452	1,488	635	1947...	799
Mar. ...	1,287	1,431	588	1946...	473
Apr. ...	1,134	1,455	626	1945...	398
May ...	1,043	1,485	718	1944...	445
June ...	1,098	1,572	770	1943...	550
July ...	984	1,509	786	1942...	501
Aug. ...	873	1,510	811	1941...	260
Sept. ...	779	1,477	795	1940...	60
Oct. ...	816	1,544	922	1939...	50
Nov. ...	....	1,615	1,147	1938...	24
Dec. ...	....	1,561	1,196	1937...	28

† Includes total of all shops. Number produced in railroad shops is very small.
Association of American Railroads

Steam Locomotives

Unfilled Orders

	1949			1948		
	Equip. Makers	Rail Shops	Total	Equip. Makers	Rail Shops	Total
Jan.	62	11	73	76	20	96
Feb.	33	10	43	89	19	108
Mar.	26	9	35	89	30	119
Apr.	17	21	38	89	28	117
May	10	20	30	86	25	111
June	10	19	29	101	22	123
July	7	18	25	99	20	119
Aug.	6	17	23	99	17	116
Sept.	5	16	21	86	15	101
Oct.	2	15	17	72	14	86
Nov.	..	..	..	65	13	78
Dec.	..	..	..	60	12	72

MONTHLY AVERAGES

Unfilled Orders, All Shops

1949*	31	1942	343
1948	104	1941	240
1947	39	1940	97
1946	73	1939	58
1945	114	1938	46
1944	177	1937	273
1943	422	1936	75

Association of American Railroads

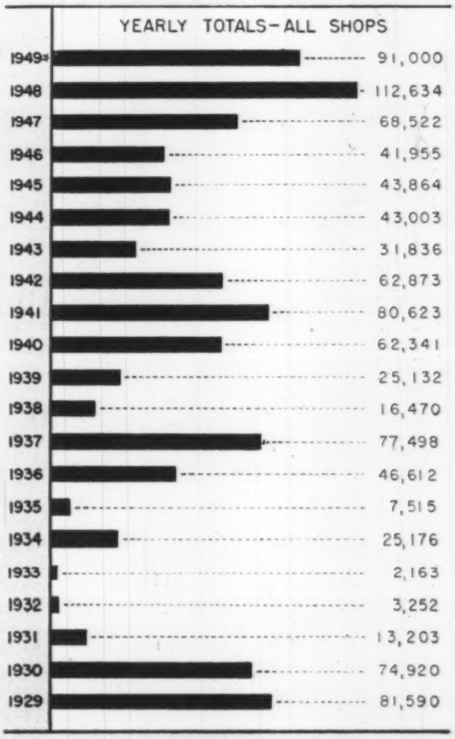
FREIGHT CAR SHIPMENTS

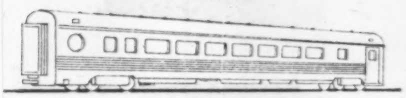
Domestic—Number of Cars

1949	Car-Builders	Railroad Shops	Total No. Cars
Jan.	6,130	2,783	8,913
Feb. ...	7,421	2,894	10,315
Mar. ...	8,958	2,952	11,910
Apr.	8,499	2,288	10,787
May ...	6,879	2,646	9,525
June ...	5,805	3,316	9,121
July	3,655	2,779	6,434
Aug. ...	4,245	2,933	7,178
Sept. ...	3,936	2,205	6,141
Oct.	2,828	1,704	4,532
Nov. ...	2,649	1,727	4,376
Dec. ...	....	....	....

1948	Car-Builders	Railroad Shops	Total No. Cars
Jan.	6,561	2,388	8,949
Feb. ...	6,306	2,157	8,463
Mar. ...	6,940	2,362	9,302
Apr. ...	6,726	2,326	9,052
May ...	6,651	2,541	9,192
June ...	7,721	2,698	10,419
July ...	6,874	1,887	8,761
Aug. ...	7,450	2,964	10,414
Sept. ...	6,978	2,831	9,809
Oct.	6,649	2,363	9,012
Nov. ...	6,976	2,318	9,294
Dec. ...	7,364	2,603	9,967

American Railway Car Institute
* Estimated





Railroad Passenger Car Shipments

Number of Cars

	1949	1948	1947	1946	Monthly	Avgs.
Jan. ..	91	83	65	494	1948....	79
Feb. ..	80	74	87	9	1947....	74
Mar. ..	76	94	74	21	1946....	114
Apr. ..	85	121	90	240	1945....	78
May ..	95	64	63	181	1944....	84
June ..	98	46	70	56	1943....	59
July ..	68	62	114	61	1942....	36
Aug. ..	70	61	24	68	1941....	30
Sept. ..	93	65	32	69	1940....	24
Oct. ..	..	92	76	45	1939....	23
Nov. ..	..	88	107	62	1938....	36
Dec. ..	..	96	85	66	1937....	52

American Railway Car Institute

Freight Car Awards

Number of Cars

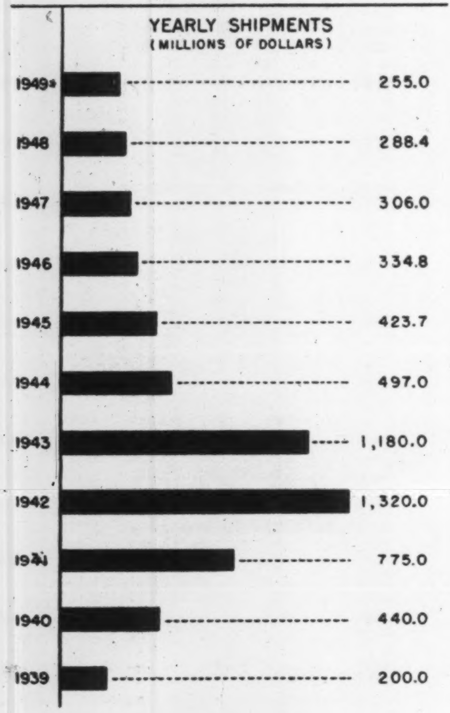
	1949	1948	1947	1946	1945
Jan. ..	1,663	8,613	9,222	1,481	7,200
Feb. ..	332	10,698	13,724	2,328	1,750
Mar. ..	199	13,227	12,048	4,512	2,500
Apr. ..	30	17,215	9,186	3,564	1,120
May ..	589	2,228	7,389	2,900	1,526
June ..	153	5,368	12,784	3,335	670
July ..	408	11,308	14,840	14,836	3,500
Aug. ..	185	3,638	2,352	9,527	7,240
Sept. ..	123	738	9,917	11,102	12,840
Oct. ..	201	10,931	17,737	3,407	1,320
Nov. ..	1,145	4,852	8,079	7,190	1,650
Dec. ..	....	8,368	4,030	3,011	4,116
Total .	....	97,184	121,308	67,193	45,432

American Railway Car Institute

Machinery & Equipment

METALWORKING FACTS AND FIGURES

MACHINE TOOLS



1949-1948 Indexes

(1945-1947 Shipments = 100)

	—Indexes of Orders— Total		Domestic		Indexes of Shipments	
	1949	1948	1949	1948	1949	1948
Jan.	87.0	83.1	65.1	69.1	68.8	75.3
Feb.	80.9	77.3	54.4	64.6	70.3	87.1
Mar.	93.5	86.3	71.2	70.2	75.8	83.6
Apr.	70.1	86.3	47.0	72.2	74.7	82.0
May	63.7	73.5	47.9	62.1	72.8	82.6
June	53.6	83.4	37.9	71.5	79.0	94.4
July	48.0	74.0	34.0	60.7	60.7	62.4
Aug.	51.5	73.7	32.7	60.1	67.3	69.8
Sept.	57.7	73.1	44.0	61.5	67.6	84.7
Oct.	56.8	67.4	43.1	53.4	62.3	80.4
Nov.	84.3	72.2	67.2	54.1	68.0	76.2
Dec.	...	76.7	...	60.5	...	96.9

National Machine Tool Builders' Association

Farm Machinery, Equipment

Manufacturers' Shipments
of Complete Units,
Attachments and Parts

	Domestic	Export
1948	$1,478,157,670	$206,432,019
1947	1,132,685,460	162,000,391
1946	763,230,488	87,247,115
1945	612,595,399	87,581,956
1944	549,310,771	68,069,766
1943	301,581,890	42,059,120

YEARLY TOTALS

1948.	$1,684,589,689	1945.	$700,177,355
1947.	1,294,685,851	1944.	617,380,537
1946.	850,477,603	1943.	343,641,010

U. S. Bureau of the Census

Earthmoving, Excavating

Shipments—Dollar Value

Power Cranes and Shovels

Qtr.	1949	1948	1947
1st ...	31,132,939	38,094,651	30,554,906
2nd ...	22,464,415	42,127,330	33,018,607
3rd ...	17,806,015	37,180,954	31,241,614
4th ...	....	47,183,043	38,021,190
Total .	....	164,585,978	132,836,317

Road Construction and Maintenance Machinery

Qtr.	1949	1948	1947
1st ...	28,394,712	28,524,625	24,051,967
2nd ...	25,880,008	30,616,159	25,594,095
3rd ...	21,746,834	29,373,671	22,514,533
4th ...	....	30,880,721	27,168,105
Total ..	....	119,395,176	99,328,700

Construction Machinery for Mounting on Tractors

Qtr.	1949	1948	1947
1st ...	10,534,941	11,728,482	9,799,865
2nd ...	10,260,459	10,806,549	10,946,890
3rd ...	8,219,954	11,239,280	9,419,468
4th ...	....	11,810,240	10,555,573
Total ..	....	48,584,551	40,721,796

Tracklaying Tractors

Qtr.	1949	1948	1947
1st ...	50,946,670	42,114,315	30,990,637
2nd ...	55,132,215	37,042,955	34,928,273
3rd ...	46,488,026	38,382,253	30,178,296
4th ...	....	49,801,077	38,263,786
Total ..	....	167,340,600	134,360,992

Wheel-type Heavy Duty Industrial Tractors

Qtr.	1949	1948	1947
1st ...	4,001,574	6,282,846	3,314,490
2nd ...	4,126,520	5,430,295	4,491,741
3rd ...	2,748,120	5,336,329	5,941,195
4th ...	....	3,681,448	4,330,875
Total ..	....	20,730,918	18,528,301

Portable Well and Blast Hole Drills

Qtr.	1949	1948	1947
1st ...	1,665,946	3,181,240	2,471,988
2nd ...	1,953,574	3,272,353	2,676,919
3rd ...	1,542,002	2,712,719	3,152,184
4th ...	....	1,747,764	3,124,735
Total ..	....	10,914,076	11,425,826

U. S. Bureau of the Census

Tractors

Manufacturers' Shipments

Wheel Type—For Farm Use

Year		Number	Value
1948	....	510,321	$466,854,652
1947	....	413,783	331,652,526
1946	....	243,271	180,362,770
1945	....	224,985	153,170,002
1944	....	235,453	157,518,924
1943	....	94,550	55,943,859

Wheel Type—For Non-Farm Use

Year		Number	Value
1948	....	18,892	$29,574,149
1947	....	14,882	17,681,997
1946	....	12,067	11,909,354
1945	....	18,707	15,725,730
1944	....	14,502	12,593,984
1943	....	9,317	7,272,952

Tracklaying Type—For Farm Use

Year		Number	Value
1948	....	14,153	$36,718,556
1947	....	11,630	28,332,401
1946	....	8,898	18,117,637
1945	....	11,149	20,973,907
1944	....	6,221	10,414,553
1943	....	2,906	6,688,395

Tracklaying Type—For Non-Farm Use

Year		Number	Value
1948	....	25,280	$125,210,088
1947	....	25,904	105,997,470
1946	....	17,367	64,816,042
1945	....	32,849	191,033,573
1944	....	38,966	250,168,422
1943	....	27,746	135,505,932

U. S. Bureau of the Census

Electric Industrial Trucks and Tractors

Shipments

	Domestic		Export		Total	
	1949	1948	1949	1948	1949	1948
Jan. ...	184	270	20	46	204	316
Feb. ...	255	258	15	100	270	358
Mar. ..	214	288	33	50	247	338
Apr. ...	142	318	57	19	199	337
May ..	179	286	29	45	208	331
June ..	175	243	30	49	205	292
July ..	133	230	35	29	168	259
Aug. ..	183	214	19	61	202	275
Sept. ..	168	229	17	27	185	256
Oct. ...	235	216	19	23	254	239
Nov. ..	...	158	...	51	...	209
Dec. ..	...	194	...	43	...	237
Total ..	...	2,904	...	543	...	3,447

YEARLY TOTALS

	Domestic	Export	Total
1948	2,904	543	3,447
1947	3,565	566	4,131
1946	2,714	160	2,874
1945	3,627	224	3,851
1944	4,380	395	4,775
1943	4,280	211	4,491
1942	4,365	207	4,572
1941	2,837	254	3,091

U. S. Bureau of the Census

Foundry Equipment Shipments

(Dollar Volume)

	—NEW EQUIPMENT—		—REPAIRS—	
	1949	1948	1949	1948
Jan.	1,213,737	1,608,537	816,018	761,887
Feb.	1,387,142	1,701,891	823,916	769,665
Mar.	955,240	1,953,967	767,386	943,804
Apr.	998,808	1,712,645	716,807	795,097
May	950,194	1,676,021	578,681	860,097
June	1,136,552	1,886,036	578,198	921,603
July	1,027,326	1,692,166	419,055	642,689
Aug.	1,057,651	1,724,777	509,963	895,383
Sept.	770,285	1,708,488	574,653	1,013,924
Oct.	979,891	1,830,490	567,492	915,122
Nov.	......	1,557,080	......	885,561
Dec.	......	1,695,792	......	1,046,796

Foundry Equip. Mfrs. Assn.

Orders Placed for New Foundry Equipment

Indexes based on 1937-38-39 monthly average as 100%

	—1949—		—1948—		1947	1946
	Dollars	Index	Dollars	Index	Index	Index
Jan.	693,747	149.9	1,432,489	380.9	466.9	391.1
Feb.	668,095	144.4	1,457,020	367.3	472.5	458.7
Mar.	882,645	190.8	1,414,401	326.2	532.3	576.7
Apr.	797,085	172.0	1,674,369	412.0	445.9	779.8
May	564,814	121.9	1,914,591	388.5	525.9	621.7
June	763,920	164.9	1,810,361	376.8	658.9	492.8
July	679,432	146.6	2,203,724	456.3	426.1	444.8
Aug.	588,975	127.1	1,573,033	324.7	411.3	555.5
Sept.	771,864	166.6	1,326,170	273.5	393.1	415.4
Oct.	618,489	133.5	1,460,707	296.0	438.2	407.1
Nov.	......	....	1,366,464	284.4	286.1	421.0
Dec.	......	....	1,184,340	243.7	467.8	379.0

* Estimated.

WELDING ELECTRODES SHIPMENTS

(Shipments in Pounds)

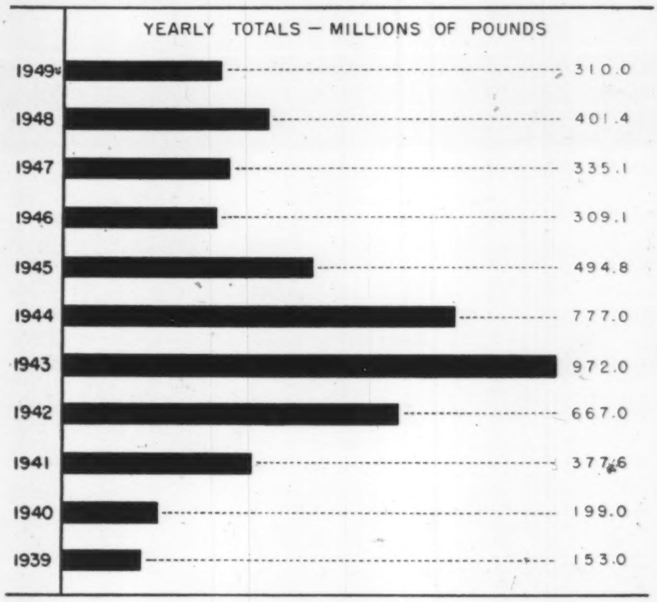
1949	Mild Steel	Alloy	Nonferrous	Total
January	33,467,917	2,790,172	190,880	36,448,975
February	31,705,971	2,003,469	148,520	33,857,960
March	30,449,999	2,715,848	194,401	33,360,248
April	24,533,727	2,718,449	136,202	27,388,378
May	18,565,723	1,975,279	138,232	20,679,234
June	17,390,987	1,781,607	100,960	19,273,554
July	19,936,384	1,969,648	133,243	21,039,275
August	17,783,949	1,472,743	108,450	19,365,142
September	22,610,040	2,144,312	155,107	24,909,459
October	20,113,900	1,738,109	176,919	22,028,928
November	....	....	......	....
December	....	....	......	....

Yearly Totals

	Mild Steel	Alloy	Nonferrous	Total
1949*	....	....	....	310,000,000
1948	369,019,831	30,214,928	2,124,496	401,359,255
1947	307,756,495	25,172,382	2,149,768	335,078,645
1946	284,126,356	24,991,208†	....	309,117,564
1945	435,789,217	59,029,938†	....	494,819,155
1944	707,756,964	69,236,137†	....	776,993,101
1943	....	....	....	971,929,782
1942	....	....	....	666,965,595
1941	....	....	....	377,564,483
1940	....	....	....	198,995,598
1939	....	....	....	152,863,373

† Includes both alloy and nonferrous electrodes.

National Electrical Mfrs. Assn.



Gear Sales

Indexes of New Orders Placed
Average Month 1935-1939=100

	1949	1948	1947	1939
Jan.	320.7	346.8	317.0	87.7
Feb.	282.3	324.4	303.0	84.3
Mar.	299.1	389.8	342.9	105.0
Apr.	339.0	320.9	346.2	86.7
May	250.1	283.6	317.2	90.7
June	227.8	324.1	278.0	93.5
July	193.1	348.4	278.5	89.8
Aug.	262.0	335.6	261.6	93.7
Sept.	224.9	320.4	297.7	125.5
Oct.	242.3	333.3	317.7	133.3
Nov.	230.7	309.0	356.9	128.6
Dec.	....	325.9	343.6	110.0

Blowers and Fans

New Orders—Thousands of Dollars

Qtrs.	1949	1948	1947	1946
1st	12,672	11,809	14,953	13,413
2nd	16,266	12,355	10,286	16,604
3rd	17,029	13,739	8,452	17,382
4th	.....	12,984	10,985	15,292

YEARLY TOTALS

1948	50,887	1944	47,174
1947	44,676	1943	55,888
1946	62,691	1942	57,048
1945	47,726	1941	33,007

U. S. Bureau of the Census

Unit Heaters

New Orders—Thousands of Dollars

Qtrs.	1949	1948	1947	1946
1st	6,549	6,467	7,259	8,417
2nd	6,075	6,686	6,074	7,628
3rd	11,432	11,811	7,912	10,193
4th	.....	11,201	9,677	10,113

YEARLY TOTALS

1948	36,165	1944	13,960
1947	30,922	1943	14,564
1946	36,351	1942	21,636
1945	22,084	1941	21,840

U. S. Bureau of the Census

Boilers, Radiators, Convectors

1949 Shipments	Boilers Thousands of lb	Radiation† Thousands of sq ft
January	10,632	2,404
February	8,239	1,823
March	7,127	1,412
April	6,042	1,305
May	8,528	1,510
June	13,155	2,221
July	14,265	2,747
August	27,270	4,130
September	33,839	5,363
October	.....	....
November	.....	....
December	.....	....

MONTHLY SHIPMENTS AVERAGES

1948	21,942	5,028
1947	27,177	4,727
1946	20,813	3,197
1945	17,176	....
1944	17,598	....
1943	15,204	....
1942	17,242	5,859
1941	24,439	7,376
1940	23,555	6,389
1939	21,009	5,566

† Includes radiators and convectors.

U. S. Bureau of the Census

Mechanical Stokers

Factory Sales—Number of Units

	1949		1948	
	Small†	Large†	Small†	Large†
Jan.	1,689	453	2,408	445
Feb.	1,625	339	4,027	480
Mar.	1,628	289	4,815	530
Apr.	1,370	271	4,264	620
May	1,375	335	5,945	682
June	2,392	536	7,417	718
July	2,080	489	7,956	842
Aug.	3,715	842	9,932	1,043
Sept.	6,108	831	13,009	1,148
Oct.	3,796	700	10,002	1,074
Nov.	....	...	4,277	736
Dec.	....	...	2,476	620
Total	....	...	76,528	8,938

YEARLY TOTALS

	Small†	Large†		Small†	Large†
1947	61,596	7,312	1942	79,062	8,938
1946	181,223	9,695	1941	182,956	9,491
1945	119,079	11,745	1940	144,758	8,067
1944	31,603	11,355	1939	96,245	8,044
1943	17,765	15,074			

† Small consists of classes 1 and 2 as defined by U. S. Bureau of the Census and large consists of classes 3, 4 and 5.

Oil Burners

Shipments—Units

	1949		1948	
	Residential	Com'l, Indus'l	Residential	Com'l, Indus'l
Jan.	24,414	1,787	36,262	2,683
Feb.	22,207	1,671	21,7[illegible]4	2,460
Mar.	24,311	1,584	15,929	2,290
Apr.	23,861	1,643	19,791	1,954
May	33,287	1,619	23,313	2,083
June	45,039	1,823	25,907	2,041
July	39,790	1,799	28,925	1,975
Aug.	71,472	2,644	47,592	2,490
Sept.	92,023	2,782	53,866	2,362
Oct.	.....	....	56,969	2,382
Nov.	.....	....	37,598	2,092
Dec.	.....	....	24,859	2,231
Total	.....	....	392,625	27,043

YEARLY TOTALS

	Residential	Com'l, Indus'l		Residential	Com'l, Indus'l
1947	1,078,576	48,776	1940	247,663†	16,569
1946	499,009	37,306	1939	201,735†	13,295
1945	139,611	30,750	1938	129,323†	9,888
1944	45,752†	31,329	1937	177,675†	15,505
1943	27,956†	44,602	1936	182,130†	14,747
1942	82,357†	48,674	1935	126,820†	12,079
1941	271,673†	32,196	1934	89,097†	11,595

† Includes water heating units
U. S. Bureau of the Census

Pumps

(Steam, power, centrifugal, rotary)
New Orders—Thousands of Dollars

	1949	1948	1947	1946	1945
Jan.	3,390	3,819	3,428	2,836	3,451
Feb.	3,247	3,635	3,506	2,728	3,326
Mar.	3,593	4,703	3,464	2,489	3,284
Apr.	2,699	4,312	3,638	2,803	3,237
May	2,775	3,724	2,973	2,856	3,177
June	3,019	3,512	2,999	2,648	3,220
July	3,358	4,075	3,148	4,014	2,925
Aug.	3,767	4,520	3,843	3,789	2,258
Sept.	2,914	3,474	3,355	3,223	2,171
Oct.	2,539	3,571	3,475	3,581	2,975
Nov.	....	3,580	2,673	3,260	2,482
Dec.	....	4,263	3,480	3,035	1,925
Total	....	47,188	39,982	37,262	34,431

MONTHLY AVERAGES

1949*	3,350	1944	3,436
1948	3,932	1943	6,214
1947	3,332	1942	6,155
1946	3,105	1941	3,606
1945	2,869	1940	2,204
1939	1,352		

Hydraulic Institute

* Estimated

Motors and Generators

New Orders—Thousands of Dollars

Qtrs.	Polyphase Induc. Motors, 1-200 hp 1949	Polyphase Induc. Motors, 1-200 hp 1948	DC Generators & Motors, 1-200 hp 1949	DC Generators & Motors, 1-200 hp 1948
1st	21,148	22,871	5,266	5,068
2nd	18,679	25,841	4,997	6,144
3rd	17,293	22,168	2,898	6,045
4th	.....	24,697	....	5,016
Total	.....	95,577	....	22,273

YEARLY TOTALS

Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
1949*	76,000	1949*	18,000
1948	95,577	1948	22,273
1947	122,043	1947	20,381
1946	142,464	1946	20,942
1945	87,621	1945	37,194
1944	68,555	1944	74,581
1943	84,862	1943	83,494
1942	114,650	1942	94,693
1941	78,357	1941	38,723

National Electrical Mfrs. Assn.

☐ ☐ ☐

Electric Industrial Furnaces

New Orders

	Kilowatts 1949	Kilowatts 1948	Value 1949	Value 1948
Jan.	9,328	4,083	$948,000	$550,000
Feb.	3,802	2,692	402,000	310,000
Mar.	4,242	4,487	436,000	776,000
Apr.	5,473	4,328	543,000	436,000
May	5,998	5,166	762,000	528,000
June	2,278	5,229	196,000	538,000
July	2,401	4,845	323,000	383,000
Aug.	1,892	4,853	210,000	390,000
Sept.	3,033	3,902	318,000	363,000
Oct.	....	7,413	......	599,000
Nov.	....	3,110	......	273,000
Dec.	....	4,960	......	690,000
Total	....	55,068	......	$5,836,000

YEARLY TOTALS

	Kilowatts	Value
1949*	48,500	$ 5,125,000
1948	55,068	5,836,000
1947	85,267	7,801,000
1946	79,498	8,430,000
1945	104,614	9,601,000
1944	128,981	10,146,000
1943	156,602	12,855,000
1942	490,559	39,052,000
1941	184,794	13,719,000

Industrial Furnace Mfrs. Assn. Inc.

☐ ☐ ☐

Rigid Steel Conduit and Fittings

Shipments—Net Tons

	1949	1948	1947
January	22,705	20,882	18,297
February	21,630	22,730	18,757
March	24,590	23,194	20,088
April	21,931	24,653	21,110
May	17,566	22,415	22,141
June	13,240	22,704	22,218
July	12,568	23,072	20,821
August	12,400	19,241	19,745
September	14,992	22,456	23,638
October	.....	24,588	23,664
November	.....	27,650	22,336
December	.....	28,113	25,319

MONTHLY AVERAGES

1949*..17,250 1948...23,475 1947...21,511
1946...16,512 1945...10,644 1944... 7,856
1943... 7,663 1942...19,548 1941...24,096
1940... 11,956 1939...11,033

Office of Domestic Commerce

☐ ☐ ☐

Shipments by Screw Machine Products Industry

Index—1940=100

	1949	1948	YEARLY AVERAGES	
Jan.	200	206	1949*..165	1937...93
Feb.	193	218	1948...204	1936...73
Mar.	203	232	1947...219	1935...60
Apr.	176	219	1946...220	1934...42
May	147	188	1945...292	1933...27
June	140	199	1944...400	1932...19
July	115	161	1943...481	1931...29
Aug.	157	198	1942...388	1930...42
Sept.	160	199	1941...221	1929...78
Oct.	174	222	1940...100	1928...65
Nov.	......	207	1939... 75	1927...46
Dec.	......	198	1938... 48	1926...48

National Screw Machine Products Association
* Estimated.

CENSUS of Manufactures

INDUSTRY	Census Year	Number of Plants	Number Employees Average for Year	Thousands of Dollars Cost of Materials	Thousands of Dollars Value Added by Mfg.	Thousands of Dollars Value Products Shipped
Aircraft	1947	58	146,625	n.a.	605,983	n.a.
	1939	44	n.a.	n.a.	112,343	n.a.
Aircraft Engines	1947	57	50,253	212,245	251,158	463,403
	1939	20	n.a.	31,276	50,928	82,204
Aircraft Propellers	1947	13	7,423	n.a.	26,685	n.a.
Aluminum, Primary	1947	11	8,919	95,748	65,262	161,010
	1939	4	3,345	27,715	36,885	64,600
Aluminum Rolling & Drawing	1947	29	27,365	254,069	150,697	404,766
	1939	13	n.a.	81,012	34,331	115,343
Automobile Trailers	1947	219	9,286	85,987	48,986	134,973
	1939	87	n.a.	5,056	3,297	8,353
Ball & Roller Bearings	1947	94	52,174	106,524	259,060	365,584
	1939	58	n.a.	27,989	77,497	105,486
Blast Furnaces	1947	86	36,937	1,385,885	328,060	1,713,945
	1939	81	22,027	463,719	87,083	550,802
Blowers & Fans	1947	192	14,794	56,287	84,429	140,716
	1939	89	n.a.	12,168	17,474	29,642
Boiler Shop Products	1947	812	68,979	345,783	358,764	704,547
	1939	478	n.a.	75,380	77,891	153,271
Bolts, Nuts, Washers, Rivets	1947	364	49,235	178,301	285,451	463,752
	1939	219	n.a.	50,634	63,999	114,633
Clay Refractories	1947	169	17,978	35,296	76,054	109,369
	1939	165	13,655	13,213	28,978	42,191
Coke (Beehive)	1947	78	3,100	48,576	21,661	70,237
	1939	29	761	3,567	1,214	4,781
Coke (By-Product)	1947	89	35,838	714,065	256,569	970,634
	1939	83	24,060	257,650	84,547	342,197
Communication Equipment	1947	101	10,976	22,825	46,767	69,592
	1939	62	n.a.	5,848	12,905	18,753
Computing & Related Machines	1947	53	46,375	62,262	231,207	293,469
	1939	38	n.a.	10,400	71,929	82,329
Construction & Mining Mchy.	1947	517	84,694	456,580	470,132	926,712
	1939	323	n.a.	81,789	101,155	182,944
Conveyors	1947	253	24,578	104,892	143,515	248,407
	1939	115	n.a.	17,192	22,931	40,123
Copper, Primary	1947	27	14,629	n.a.	134,658	n.a.
Copper Rolling & Drawing	1947	78	53,867	761,066	302,592	1,063,658
	1939	57	n.a.	214,503	135,642	350,145
Cutlery	1947	195	20,248	37,738	104,833	142,571
	1939	124	n.a.	14,400	28,381	42,781
Cutting Tools, Jigs, Fixtures	1947	3,549	88,898	143,452	480,375	623,827
	1939	1,015	n.a.	32,676	96,855	129,531
Domestic Laundry Equip.	1947	65	28,403	280,539	161,791	442,297
	1939	42	9,610	36,365	25,236	61,601
Edge Tools	1947	238	8,828	21,966	40,472	62,438
	1939	163	n.a.	5,591	13,183	18,774
Electric Lamps	1947	62	23,842	82,904	120,344	203,248
	1939	55	11,587	28,571	56,257	84,828
Electrical Appliances	1947	326	44,371	236,286	236,241	466,009
	1939	118	n.a.	42,612	42,150	84,762
Electrical Control Apparatus	1947	324	72,330	233,108	395,175	628,283
	1939	217	n.a.	39,477	71,830	111,307
Electrical Meas. Instruments	1947	154	20,926	49,434	103,946	153,380
	1939	59	9,318	12,104	29,693	41,797
Electrical Welding Apparatus	1947	108	7,265	46,402	57,310	103,712
	1939	47	n.a.	10,339	10,313	20,652
Electrometallurgical Products	1947	19	9,628	95,411	55,493	150,904
	1939	18	n.a.	25,119	15,868	40,987
Electronic Tubes	1947	51	27,703	35,539	94,040	124,518
	1939	26	n.a.	12,932	23,901	36,833
Elevators & Escalators	1947	111	10,227	33,201	68,614	101,815
	1939	101	n.a.	9,871	16,945	26,816
Engine Electrical Equipment	1947	110	43,920	156,988	196,351	353,339
	1939	90	n.a.	40,565	66,066	106,631
Fabricated Pipe & Fittings	1947	212	10,568	57,190	58,786	115,976
	1939	112	n.a.	12,172	10,842	23,014
Fab. Struc. Steel & Ornamental Metal Work	1947	1,667	79,678	423,734	440,701	864,435
	1939	1,171	n.a.	175,785	116,925	292,710
Farm Machinery (except Tractors)	1947	1,008	94,118	466,938	421,700	888,638
	1939	393	n.a.	83,367	94,237	177,604
Food Products Machinery	1947	622	36,839	135,202	191,214	326,416
	1939	406	n.a.	33,082	58,587	91,669
Galvanizing	1947	125	3,056	11,815	15,296	27,111
	1939	83	1,459	2,513	3,683	6,196
Gray Iron Foundries	1947	1,654	173,776	440,024	732,647	1,172,671
	1939	1,254	n.a.	108,564	169,278	277,842
Hand Saws, Saw Blades	1947	89	8,441	27,455	42,975	70,430
	1939	87	4,902	6,785	11,686	18,471
Indus. Furnaces & Ovens	1947	108	6,341	36,364	38,990	75,354
	1939	60	n.a.	7,242	7,766	15,008
Indus. Trucks, Tractors	1947	197	13,974	80,814	81,789	162,603
	1939	70	n.a.	17,174	13,181	30,355
Insulated Wire	1947	171	21,282	197,394	103,722	301,116
	1939	79	19,233	70,125	50,265	120,390
Internal Combustion Engines	1947	134	71,424	356,385	327,152	683,537
	1939	74	19,962	53,456	56,902	110,358
Iron & Steel Forgings	1947	250	36,724	172,986	197,111	370,097
	1939	192	n.a.	48,576	49,426	98,002
Laundry & Dry-Cleaning Mchy.	1947	127	9,093	40,626	54,347	94,361
	1939	88	n.a.	9,026	13,358	22,384
Lead, Primary	1947	16	4,663	n.a.	35,902	n.a.
Lighting Fixtures	1947	1,206	47,596	227,140	247,619	474,759
	1939	568	25,686	59,851	64,731	124,582
Locomotives & Parts	1947	36	30,337	212,229	142,477	354,706
	1939	20	n.a.	27,903	23,450	51,353
Machine Shops	1947	3,112	58,160	138,394	271,870	410,264
	1939	1,325	n.a.	48,566	82,106	130,672

2

INDUSTRY	Census Year	Number of Plants	Number Employees Average for Year	Thousands of Dollars: Cost of Materials	Thousands of Dollars: Value Added by Mfg.	Thousands of Dollars: Value Products Shipped
Machine Tools	1947	316	70,657	153,917	347,965	501,882
	1939	224	n.a.	65,326	155,941	221,267
Malleable Iron Foundries	1947	78	29,862	62,739	121,661	184,400
	1939	83	20,186	17,951	35,500	53,451
Measuring & Dispensing Pumps	1947	52	12,083	60,439	66,223	125,052
	1939	38	7,395	19,019	25,267	44,286
Mechanical Stokers	1947	46	4,111	16,622	22,212	38,834
	1939	65	n.a.	10,158	15,407	25,565
Metal Barrels, Drums, Pails	1947	70	10,915	108,941	64,119	173,060
	1939	64	6,964	32,328	16,838	49,166
Metal Doors, Sash, Trim	1947	320	21,079	88,446	117,642	206,088
	1939	188	n.a.	17,663	27,425	45,088
Metal Foil	1947	43	4,261	33,199	21,439	54,638
	1939	39	n.a.	13,254	11,051	24,305
Metal Stampings	1947	1,981	132,011	521,816	642,483	1,164,299
	1939	965	n.a.	158,082	168,209	326,291
Metalworking Machinery†	1947	428	54,988	217,340	302,842	520,182
	1939	231	n.a.	40,292	73,439	113,731
Motorcycles & Bicycles	1947	76	15,615	90,832	72,838	163,670
	1939	36	8,302	24,041	19,011	43,052
Motor Vehicles & Parts	1947	963	653,169	n.a.	3,577,404	n.a.
Motors & Generators	1947	256	127,012	437,680	569,745	1,007,186
	1939	132	n.a.	104,242	159,954	264,196
Nails & Spikes	1947	68	3,805	14,317	15,721	30,038
	1939	36	2,996	5,836	7,072	12,908
Nonferrous Foundries	1947	1,724	65,342	266,303	295,834	562,137
	1939	776	n.a.	65,092	67,590	132,682
Nonferrous Metals, Secondary	1947	322	18,402	604,360	119,667	724,027
	1939	280	n.a.	212,182	41,381	253,563
Office Furniture, Metal	1947	103	14,691	47,522	80,872	128,394
	1939	63	n.a.	15,407	23,076	38,483
Oil Burners	1947	151	6,318	62,393	44,388	106,781
	1939	133	n.a.	10,413	8,391	18,804
Oil Field Mchy. & Tools	1947	230	29,177	117,588	171,265	288,853
	1939	239	n.a.	31,451	58,101	89,552
Paper Industries Machinery	1947	149	17,088	69,727	81,358	151,085
	1939	116	n.a.	13,017	20,198	33,215
Plating & Polishing	1947	1,802	28,223	51,104	125,388	176,492
	1939	643	9,653	7,300	20,868	28,168
Plumbing Fixtures & Fittings, Metal	1947	277	34,089	135,963	155,944	291,907
	1939	247	n.a.	45,648	66,743	112,391
Power Transmission Equip.	1947	416	54,316	148,104	283,647	431,751
	1939	250	n.a.	40,799	68,488	109,287
Printing-Trades Machy.	1947	326	24,752	67,138	131,625	198,763
	1939	254	n.a.	15,419	41,137	56,556
Pumps & Compressors	1947	447	54,726	270,031	282,476	552,507
	1939	369	n.a.	57,034	84,780	141,814
Radios & Related Products	1947	857	178,595	n.a.	773,233	n.a.
	1939	305	n.a.	n.a.	125,429	n.a.
Railroad & Street Cars	1947	86	60,779	452,717	273,130	725,847
	1939	48	n.a.	85,538	58,801	144,339
Refrigeration Machinery	1947	561	129,290	n.a.	597,486	n.a.
	1939	343	n.a.	n.a.	147,009	n.a.
Safes & Vaults	1947	26	3,754	9,782	19,434	29,216
	1939	16	1,558	2,413	3,671	6,084
Scales & Balances	1947	75	6,526	19,776	34,766	54,542
	1939	56	3,757	4,987	9,363	14,350
Screw Machine Products	1947	1,207	28,492	76,689	143,853	220,542
	1939	288	n.a.	20,910	31,654	52,564
Sewing Machines	1947	70	15,305	28,880	68,681	97,011
	1939	39	9,568	8,611	21,096	29,707
Sheetmetal Work	1947	1,708	42,643	197,859	226,446	424,305
	1939	1,262	24,740	70,981	66,360	137,341
Ship, Boat Building & Repairing	1947	1,110	149,655	330,377	586,558	916,935
	1939	608	78,127	158,374	179,898	338,272
Springs, Steel	1947	81	7,760	46,770	45,876	92,646
	1939	53	3,591	12,795	10,249	23,044
Steam Engines & Turbines	1947	17	21,640	48,974	80,947	129,921
	1939	20	n.a.	9,866	15,782	25,648
Steel Foundries	1947	204	63,668	145,880	267,214	413,094
	1939	164	35,567	45,232	90,234	135,466
Steel Works & Rolling Mills	1947	215	500,799	n.a.	2,275,697	n.a.
	1939	253	413,280	n.a.	1,147,548	n.a.
Storage Batteries	1947	246	15,570	183,408	114,246	297,654
	1939	190	n.a.	48,932	35,841	84,773
Structural & Ornamental Products	1947	1,667	79,678	423,734	440,701	864,435
	1939	1,171	n.a.	175,785	116,925	292,710
Telephone & Telegraph Equip.	1947	90	76,072	304,765	384,417	689,182
	1939	43	n.a.	22,546	98,715	121,261
Textile Machy.	1947	489	53,583	146,949	256,436	403,385
	1939	339	n.a.	34,876	62,033	96,909
Tin Cans, Other Tinware	1947	217	46,890	447,907	231,953	679,860
	1939	195	n.a.	242,669	116,152	358,821
Tractors	1947	94	77,317	558,779	332,062	890,841
	1939	28	n.a.	127,607	116,721	244,328
Transformers	1947	144	36,635	162,085	195,102	356,968
	1939	47	n.a.	32,711	38,898	71,609
Truck & Bus Bodies	1947	603	26,646	114,868	127,429	242,297
Truck Trailers	1947	119	12,020	85,596	65,257	150,853
	1939	99	n.a.	22,356	13,626	35,982
ypewriters	1947	28	26,604	32,539	121,385	153,924
	1939	18	n.a.	10,830	29,096	39,926
acuum Cleaners	1947	34	14,880	74,994	91,047	160,184
	1939	21	n.a.	9,132	33,113	42,245
alves & Fittings (Except Plumbers)	1947	453	80,075	243,603	393,860	637,463
	1939	298	n.a.	57,416	107,511	164,927
treous-Enameled Products	1947	49	12,240	29,266	45,116	74,382
	1939	55	12,480	20,348	23,891	44,239
tches & Clocks	1947	194	34,623	171,725	169,474	341,199
	1939	64	n.a.	34,306	47,169	81,475
ded & Heavy Riveted Pipe	1947	50	13,144	129,261	89,614	218,875
	1939	49	9,670	41,857	34,008	75,865
s Drawing	1947	134	55,079	597,307	314,788	912,095
	1939	95	25,980	99,982	76,521	176,503
ng Devices & Supplies	1947	342	38,367	164,503	213,596	378,099
	1939	141	n.a.	43,428	47,951	91,379
dworking Machinery	1947	294	15,642	58,966	86,360	145,326
	1939	148	n.a.	7,783	12,677	20,460
Primary	1947	20	12,424	113,928	77,068	190,996

udes establishments engaged in manufacturing machinery for shaping, pressing, forging or ng metal where the shaping action is not dependent on a cutting tool.

CONTAINERS AND CLOSURES

Heavy Steel Barrels and Drums

Shipments for Sale—Number of Units

	1949	1948	1947
Jan.	2,065,302	2,239,132	2,316,552
Feb.	1,801,427	2,097,649	2,065,821
Mar.	1,917,029	2,516,252	2,292,357
Apr.	1,744,641	2,290,066	2,459,232
May	1,921,169	2,018,503	2,312,378
June	2,086,560	2,248,834	2,253,029
July	1,832,862	2,084,272	2,184,761
Aug.	1,989,955	2,305,825	2,212,088
Sept.	2,419,428	2,165,008	2,200,756
Oct.	....	2,336,268	2,305,055
Nov.	....	2,306,601	2,075,066
Dec.	....	2,461,307	2,384,968

YEARLY TOTALS

1948 ..	27,069,717	1945 ..	22,251,101
1947 ..	27,062,063	1944 ..	19,931,227
1946 ..	22,729,346	1943 ..	27,219,206

□ □ □

Light Steel Barrels and Drums

Shipments for Sale—Number of Units

	1949	1948	1947
Jan.	508,934	613,305	466,307
Feb.	442,635	563,115	430,170
Mar.	429,751	655,552	417,122
Apr.	447,014	642,957	542,973
May	476,101	602,671	470,474
June	558,392	683,450	499,808
July	515,359	592,658	505,754
Aug.	574,155	654,319	554,208
Sept.	576,457	575,547	488,212
Oct.	....	564,650	572,424
Nov.	....	570,123	485,571
Dec.	....	627,965	599,181

YEARLY TOTALS

1948 ..	7,346,312	1945 ..	6,564,746
1947 ..	6,032,204	1944 ..	5,173,000
1946 ..	6,432,138	1943 ..	3,941,426

□ □ □

Steel Shipping Packages, Kegs and Pails

Shipments for Sale—Number of Units

	1949	1948	1947
Jan.	3,599,421	4,308,873	5,618,218
Feb.	3,512,127	3,948,134	4,663,638
Mar.	3,861,869	5,196,356	4,762,732
Apr. ...	3,871,620	4,721,994	5,542,271
May ...	4,326,836	4,381,507	5,127,327
June	4,499,699	4,850,644	4,774,813
July	4,392,559	4,410,385	4,329,432
Aug.	5,375,213	5,341,249	4,368,779
Sept.	5,531,939	5,234,888	4,456,440
Oct.	....	5,270,246	4,765,261
Nov.	....	4,726,134	4,314,604
Dec.	....	4,545,871	4,857,600

YEARLY TOTALS

1948 ..	56,936,281	1946 ..	51,808,792
1947 ..	57,581,115	1945 ..	57,698,050

□ □ □

Metal Cans

Tons of Steel Consumed in Shipments for Sale

	1949	1948	1947
Jan.	157,631	182,356	138,211
Feb.	163,389	170,825	123,767
Mar.	172,320	170,289	142,649
Apr.	169,194	165,749	160,095
May	189,024	175,915	165,095
June	259,026	239,309	193,281
July	282,977	272,994	275,541
Aug.	444,976	350,404	344,236
Sept.	371,665	351,567	310,937
Oct.	....	258,316	240,670
Nov.	....	202,508	182,342
Dec.	....	230,872	222,797

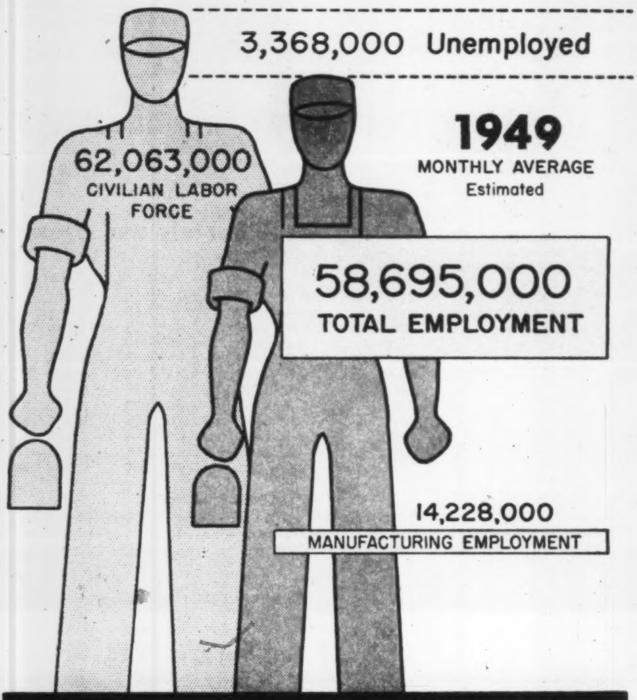
YEARLY TOTALS

1948 ..	2,771,104	1945 ..	*2,275,438
1947 ..	2,499,621	1944 ..	*1,760,855
1946 ..	2,348,681	1943 ..	*1,421,798

---

* Estimated.

U. S. Bureau of the Census



TOTAL U.S. EMPLOYMENT

(In Thousands)

	Civilian Labor Force	Total Employment	Unemployment	Mfg. Employment
1949 By Months				
Jan.	60,078	57,414	2,664	14,782
Feb.	60,388	57,167	3,221	14,649
Mar.	60,814	57,647	3,167	14,475
Apr.	60,835	57,819	3,016	14,177
May	61,983	58,694	3,289	13,877
June	63,398	59,619	3,778	13,884
July	63,815	59,720	4,095	13,758
Aug.	63,637	59,947	3,689	14,128
Sept.	62,763	59,411	3,351	14,322
Oct.	62,576	59,001	3,576	.....
Nov.	62,927	59,518	3,409	.....
1948 By Months				
Jan.	59,214	57,149	2,065	15,408
Feb.	59,778	57,139	2,639	15,345
Mar.	59,769	57,329	2,440	15,369
Apr.	60,524	58,330	2,193	15,028
May	60,422	58,660	1,761	14,947
June	63,479	61,296	2,184	15,107
July	63,842	61,615	2,227	15,155
Aug.	63,186	61,245	1,941	15,400
Sept.	62,212	60,312	1,899	15,617
Oct.	61,776	60,134	1,642	15,514
Nov.	61,775	59,893	1,831	15,368
Dec.	61,724	59,434	1,941	15,174
1948 Av. .	61,442	59,378	2,064	15,283
1947 By Months				
Jan.	57,790	55,390	2,400	15,244
Feb.	58,010	55,520	2,490	15,302
Mar.	58,390	56,060	2,330	15,301
Apr.	59,120	56,700	2,420	15,180
May	60,290	58,330	1,960	14,973
June	62,609	60,055	2,555	15,029
July	62,664	60,079	2,584	14,887
Aug.	61,665	59,569	2,096	15,230
Sept.	60,784	58,872	1,912	15,429
Oct.	60,892	59,204	1,687	15,439
Nov.	60,216	58,595	1,621	15,446
Dec.	59,590	57,947	1,643	15,502
1947 Av. .	60,168	58,027	2,142	15,247
MONTHLY AVERAGES				
1946	57,520	55,250	2,270	14,461
1945	53,860	52,820	1,040	15,302
1944	54,630	53,960	670	17,111
1943	55,540	54,470	1,070	17,381
1942	56,410	53,750	2,660	15,051
1941	55,910	50,350	5,560	12,974
1940	55,640	47,520	8,120	10,780
1939	55,230	45,750	9,480	10,078
1938	54,610	44,220	10,390	9,253
1937	54,000	46,300	7,700	10,606
1936	53,440	44,410	9,030	9,653
1935	52,870	42,260	10,610	8,907

U. S. Department of Labor
U. S. Department of Commerce

Steel Employment, Wages, Hours and Payrolls

	Number Employees	Av. Hrly. Earnings	Av. Hrs. per Week	Total Payrolls
1949 By Months				
Jan.	650,200	$1.713	39.0	$202,057,000
Feb.	652,800	1.696	40.1	189,751,000
Mar.	651,700	1.685	40.6	207,152,000
Apr.	646,600	1.688	38.5	191,586,000
May	637,400	1.697	37.0	188,439,000
June	624,500	1.684	37.6	181,787,000
July	609,600	1.699	31.8	160,301,000
Aug.	603,100	1.682	36.5	175,607,000
Sept.	600,200	1.712	36.8	173,450,000
1948 By Months				
Jan.	622,000	$1.573	39.6	$180,253,000
Feb.	626,200	1.551	39.1	167,600,000
Mar.	628,800	1.548	40.6	183,045,000
Apr.	626,200	1.551	38.0	168,500,000
May	627,600	1.577	38.0	175,300,000
June	633,600	1.569	39.9	179,483,000
July	641,000	1.645	36.4	179,846,000
Aug.	644,500	1.689	38.1	193,800,000
Sept.	641,000	1.718	40.1	199,400,000
Oct.	644,100	1.699	39.5	201,668,000
Nov.	646,200	1.721	39.8	199,800,000
Dec.	647,600	1.694	40.0	205,848,000
Year 1948 ..	635,600	1.630	39.1	2,234,461,000
1947 By Months				
Jan.	601,200	$1.381	40.3	$155,778,000
Feb.	606,700	1.370	39.0	139,482,000
Mar.	608,800	1.379	38.2	150,560,000
Apr.	610,700	1.533	40.0	168,266,000
May	614,800	1.556	39.1	175,793,000
June	622,600	1.547	38.1	167,625,000
July	623,000	1.539	35.9	163,200,000
Aug.	625,000	1.556	37.1	169,100,000
Sept.	618,000	1.571	38.3	168,900,000
Oct.	620,000	1.546	40.6	180,100,000
Nov.	624,000	1.587	38.1	171,000,000
Dec.	620,900	1.565	38.6	175,273,000
Year 1947 ..	616,300	1.513	38.6	1,986,600,000
1946 By Months				
Jan.-Feb. ...	522,300	$1.314	24.0	$169,890,500
Mar.	570,500	1.351	37.9	138,756,000
Apr.	581,800	1.341	37.2	134,347,800
May	562,900	1.358	32.6	121,422,200
June	578,000	1.344	34.6	125,589,900
July	585,100	1.351	36.9	137,988,000
Aug.	595,600	1.346	38.5	145,226,300
Sept.	595,700	1.362	37.5	139,625,000
Oct.	595,700	1.341	40.3	150,637,500
Nov.	600,000	1.367	38.0	143,440,700
Dec.	594,200	1.352	35.7	137,216,500
Year 1946 ..	575,300	1.347	35.1	1,544,142,000
MONTHLY AVERAGES (Total Payrolls)				
1947	616,300	$1.513	38.6	$1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000
1942	647,200	1.056	38.9	1,467,058,700
1941	633,000	.959	38.6	1,301,347,800
1940	546,800	.850	36.2	960,779,300
1939	482,585	.840	34.8	812,775,082
1938	442,739	.830	27.6	613,198,987
1937	572,244	.818	36.8	976,083,169
1936	499,704	.668	39.8	758,059,542
1935	425,941	.655	34.2	557,793,724
1934	409,349	.628	29.5	457,842,517

American Iron & Steel Institute

Employment & Wages

METALWORKING FACTS AND FIGURES

METALWORKING, WAGES & HOURS (Production Workers)

(Average Hourly Wages and Average Weekly Hours)

	PRIMARY METALS		FABRICATED METAL PRODUCTS		MACHINERY Except Electrical		ELECTRICAL MACHINERY		TRANSPORTATION EQUIPMENT		INSTRUMENTS Related Products	
	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours
1949*												
Jan.	$1.593	40.0	$1.452	40.1	$1.524	40.5	$1.436	39.7	$1.660	39.9	$1.384	40.0
Feb.	1.587	39.8	1.454	39.7	1.524	40.4	1.440	39.6	1.653	39.8	1.389	39.8
Mar.	1.582	39.0	1.452	39.5	1.525	39.9	1.445	39.1	1.637	38.6	1.390	39.7
Apr.	1.584	38.4	1.452	38.7	1.523	39.1	1.444	38.5	1.643	38.7	1.387	39.3
May	1.581	38.0	1.453	39.0	1.523	39.2	1.443	38.8	1.650	38.2	1.388	39.5
June	1.591	37.6	1.464	39.2	1.529	39.2	1.440	39.0	1.658	39.5	1.393	39.2
July	1.588	36.9	1.467	39.4	1.531	39.0	1.447	38.7	1.661	39.9	1.394	39.0
Aug.	1.582	37.6	1.468	39.6	1.530	39.1	1.453	39.2	1.661	39.3	1.391	39.0
Sept.	1.601	37.8	1.475	39.7	1.540	39.4	1.448	39.9	1.667	40.0	1.398	39.6
Oct.	1.565	...	1.464	...	1.537	...	1.440	...	1.652	...	1.404	...
1948 (Av.)	1.522	40.1	1.396	40.6	1.469	41.2	1.388	40.1	1.579	39.0	1.333	40.1
1947 (Av.)	1.388	39.8	1.276	40.8	1.350	41.4	1.272	40.3	1.447	39.3	1.220	40.3

U. S. Department of Labor

Steel Common Labor Rates

	Hourly wage	Per cent over 1915
1915	20.0	....
February 1, 1916	22.0	10.0
May 1, 1916	25.0	25.0
December 15, 1916	27.5	37.5
May 1, 1917	30.0	50.0
October 1, 1917	33.0	65.0
April 16, 1918	38.0	90.0
August 1, 1918	42.0	110.0
October 1, 1918	46.2	131.0
February 1, 1920	50.6	153.0
May 16, 1921	40.5	102.5
July 16, 1921	37.0	85.0
August 29, 1921	30.0	50.0
September 1, 1922	36.0	80.0
April 16, 1923	40.0	100.0
August, 1923	44.0	120.0
October 1, 1931	39.6	98.0
May 16, 1932	33.7	68.5
August 19, 1933 (NRA)	40.0	100.0
April 1, 1934	44.0	120.0
November, 1936	52.5	162.0
March, 1937	62.5	212.5
April, 1941	72.5	262.5
July, 1942	78.0	290.0
February, 1946	96.5	392.5
April, 1947	109.0	445.0
July 16, 1948	118.5	492.5

Compiled by STEEL

Work Stoppages

	Number of Stoppages	Workers Involved	Man-Days Lost
1949 (10 mos.)	4,775	4,060,000	44,100,000
Jan.	400	110,000	800,000
Feb.	350	120,000	650,000
Mar.	400	540,000	3,600,000
Apr.	500	225,000	1,800,000
May	600	320,000	3,200,000
June	550	660,000	4,600,000
July	525	225,000	2,100,000
Aug.	550	250,000	2,000,000
Sept.	475	610,000	6,350,000
Oct.	425	1,000,000	19,000,000
1948	3,419	1,960,000	34,100,000
1947	3,693	2,170,000	34,600,000
1946	4,985	4,600,000	116,000,000
1945	4,750	3,470,000	38,000,000
1935-39 Av.	2,862	1,130,000	16,900,000

U. S. Department of Labor

Average Wages, Hours and Employment of All Metalworking Production Workers

AVERAGE	1949*	1948	1947
HOURS PER WEEK	39.2 HOURS	40.2 HOURS	40.3 HOURS
HOURLY EARNINGS	$1.543	$1.475	$1.350
ANNUAL EMPLOYMENT	4,484,000	4,985,000	5,078,000

METALWORKING EMPLOYMENT

(All Wage and Salary Workers, in Thousands)

	TOTAL	Primary Metals	Fabricated Metal Products	Machinery Except Electrical	Electrical Machinery	Transportation Equip.	Instruments etc.
1949*							
Jan.	6,022	1,257	932	1,481	834	1,267	251
Feb.	5,929	1,245	917	1,458	818	1,245	246
Mar.	5,838	1,229	890	1,431	795	1,248	245
Apr.	5,701	1,195	867	1,385	770	1,242	242
May	5,495	1,158	843	1,327	746	1,183	238
June	5,444	1,135	838	1,285	724	1,225	237
July	5,344	1,095	824	1,239	712	1,239	231
Aug.	5,338	1,093	842	1,240	711	1,221	231
Sept.	5,396	1,105	864	1,230	739	1,225	233
1948 (Av.)	6,148	1,247	976	1,533	869	1,263	260
1947 (Av.)	6,207	1,231	995	1,535	918	1,263	265

U. S. Department of Labor

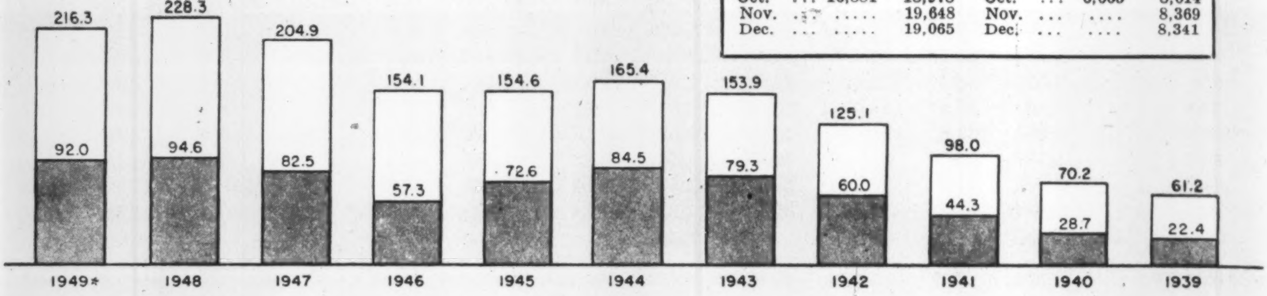
* Estimated

Trade

ANNUAL SALES TOTALS

(BILLIONS OF DOLLARS)
Entire Bar=All Manufacturing Industries
Shaded Area=Durable Goods Industries

U. S. Office of Business Economics



1949-1948 By Months

(Millions of Dollars, Seasonally Adjusted)

All Manufacturing Industries	1949	1948	Durable Goods Industries	1949	1948
Jan.	17,880	18,229	Jan. ...	7,550	7,281
Feb.	18,175	18,470	Feb. ...	7,757	7,516
Mar. ...	18,451	18,761	Mar. ...	7,805	7,779
Apr. ...	17,643	18,631	Apr. ...	7,445	7,534
May ...	17,741	18,574	May ...	7,488	7,569
June ...	17,990	19,454	June ...	7,745	7,998
July ...	17,114	18,973	July ...	7,207	7,749
Aug. ...	18,945	19,652	Aug. ...	7,982	8,093
Sept. ...	18,866	19,902	Sept. ...	7,878	8,394
Oct. ...	16,881	18,978	Oct. ...	6,665	8,014
Nov. ...	.....	19,648	Nov. ...	....	8,369
Dec. ...	.....	19,065	Dec. ...	....	8,341

Inventories at End of Month

Millions of Dollars, Seasonally Adjusted

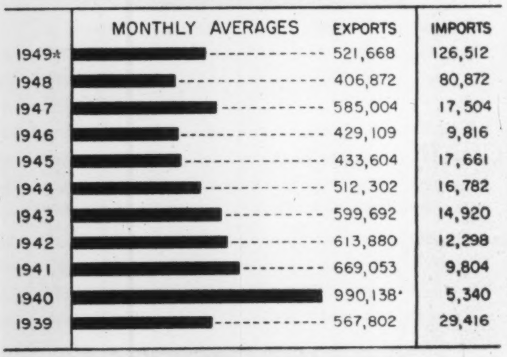
	All Manufacturing Industries 1949	All Manufacturing Industries 1948	Durable Goods Industries 1949	Durable Goods Industries 1948
January	34,409	30,044	16,539	14,300
February	34,409	30,318	16,629	14,416
March	34,223	30,686	16,528	14,500
April	34,018	31,040	16,466	14,596
May	33,565	31,491	15,994	14,708
June	33,250	32,211	15,727	15,001
July	32,367	32,580	15,225	15,126
August	31,638	32,841	14,741	15,270
September	31,059	33,380	14,266	15,479
October	30,842	33,528	13,954	15,611
November	.....	33,810	.....	15,895
December	.....	34,066	.....	16,182

U. S. Office of Business Economics

IRON AND STEEL PRODUCTS

EXPORTS AND IMPORTS

Excluding Advanced Manufactures—Net Tons



1949-1948 By Months

	EXPORTS 1949	EXPORTS 1948	IMPORTS 1949	IMPORTS 1948
January ...	436,255	542,751	284,142	21,323
February ..	386,939	486,956	293,209	15,234
March	455,940	494,766	298,844	45,621
April	565,140	438,560	184,289	48,798
May	553,950	381,707	161,729	27,982
June	599,093	380,391	109,133	55,263
July	668,053	366,149	56,133	50,754
August	509,644	343,673	50,667	67,741
September .	521,553	326,221	19,327	129,400
October	......	377,496	......	162,035
November ..	......	281,097	......	119,611
December ..	......	463,376	......	181,716

U. S. Office of Business Economics

Manufacturers' New Orders

Value—Millions of Dollars

1949	Total Durables	Iron and Steel	Non-ferrous Metals	Elec. Mchy.	Other Mchy.	Transp. Equip.	Other† Durables	Total Durables 1948	Total Durables 1947	Total Durables 1946
Jan. ..	6,703	2,034	594	699	918	—155‡	2,613	7,233	6,254	5,761
Feb. ..	6,734	1,832	514	612	1,016	384	2,376	7,076	6,150	4,280
Mar. ..	7,185	1,816	570	754	1,151	296	2,598	8,057	6,593	5,880
Apr. ..	6,127	1,425	437	619	985	160	2,501	7,353	6,143	5,968
May ..	5,993	1,328	358	584	986	495	2,241	6,739	5,968	6,440
June ..	6,544	1,504	418	702	1,017	217	2,686	8,912	6,319	5,648
July ..	6,195	1,284	365	561	858	263	2,865	7,972	5,948	6,002
Aug. ..	7,407	1,776	615	687	938	244	3,146	8,170	6,001	5,978
Sept. .	7,572	1,451	583	810	996	377	3,355	8,206	7,126	5,889
Oct. ..	7,602	1,960	562	817	959	326	2,976	8,108	7,463	6,042
Nov. ..	....	....	...	...	...	...	....	7,722	6,991	5,274
Dec. ..	....	....	...	...	...	...	....	7,570	7,556	6,309

---

† Other durables include motor vehicles and equipment, lumber, furniture, stone, clay and glass and miscellaneous. ‡ Net cancellations.

U. S. Office of Business Economics

Foreign Trade

Value—Millions of Dollars

	EXPORTS 1949	EXPORTS 1948	EXPORTS 1947	IMPORTS 1949	IMPORTS 1948	IMPORTS 1947
Jan.	1,104	1,092	1,193	590	545	531
Feb.	1,043	1,086	1,198	567	582	437
Mar.	1,177	1,139	1,383	632	666	445
Apr.	1,164	1,120	1,362	534	528	512
May	1,089	1,102	1,503	540	554	474
June	1,104	1,015	1,320	527	625	463
July	898	1,019	1,265	456	563	450
Aug.	880	992	1,265	491	606	400
Sept. ...	904	925	1,185	530	560	473
Oct.	849	1,023	1,304	559	601	492
Nov.	....	823	1,187	...	554	455
Dec.	....	1,317	1,172	...	720	603

Monthly Averages

	Exports	Imports
1949* ...	993	544
1948	1,054	592
1947	1,278	478
1946	812	409
1945	817	346
1944	1,188	327
1943	1,080	282
1942	673	229
1941	428	279
1940	335	219
1939	265	193

Bureau of Foreign and Domestic Commerce

Iron and Steel Scrap

(Net Tons)

	Exports 1949	Exports 1948	Imports 1949	Imports 1948
Jan.	9,971	14,701	166,448	5,149
Feb.	10,157	21,784	199,846	4,219
Mar.	12,244	22,011	239,226	19,973
Apr.	33,217	28,986	118,839	15,803
May	53,114	19,675	127,675	11,509
June	50,866	21,512	91,838	19,979
July	184,052	28,550	52,359	15,260
Aug.	27,342	10,844	43,207	26,449
Sept.	22,453	11,073	5,618	72,034
Oct.	.....	19,181	.....	77,598
Nov.	.....	27,498	.....	70,886
Dec.	.....	16,010	.....	76,214

Monthly Averages

	Exports	Imports
1949* ..	40,000	90,000
1948 ...	20,169	34,589
1947 ...	16,185	3,016
1946 ...	12,425	2,519
1945 ...	7,978	3,856
1944 ...	7,973	9,070
1943 ...	4,575	11,955
1942 ...	11,811	7,680
1941 ...	75,354	5,997
1940 ...	263,274	189
1939 ...	334,548	2,753

U. S. Office of Business Economics

* Estimated

Trade

METALWORKING FACTS AND FIGURES

Businesses in Operation

(In Thousands at End of Quarter)

	Total	Contract Construction	Manufacturing	Service
1949 (Avg.)*	3,925.0	....	....	....
First Qtr.	3,935.3	323.4	308.1	849.1
Second Qtr.	.....	....	....	....
1948 (Avg.)	3,978.7	320.9	326.7	854.9
First Qtr.	3,966.8	312.4	329.3	852.8
Second Qtr.	3,994.2	322.0	329.9	858.2
Third Qtr.	3,989.1	325.4	327.6	856.3
Fourth Qtr.	3,964.7	323.9	320.0	852.4
Annual Averages				
1947	3,879.0	289.3	330.5	830.5
1946	3,605.4	242.6	301.9	772.8
1945	3,258.4	176.7	262.8	706.0
1944	3,062.2	153.4	245.2	657.1
1943	3,045.1	157.5	238.8	625.5
1942	3,302.2	177.2	237.9	699.2
1941	3,363.6	186.8	235.3	705.8
1940	3,382.8	199.2	226.7	718.3
1939	3,305.6	199.7	223.0	701.8

U. S. Office of Business Economics

New Business Incorporations

	1949	1948	1947	1946
January	7,906	11,000	12,112	13,006
February	6,362	7,873	9,111	10,554
March	7,637	9,346	10,247	12,225
April	7,273	9,223	9,802	12,469
May	7,445	8,246	9,179	12,044
June	7,260	8,550	8,922	11,402
July	6,424	7,690	9,041	11,987
August	6,828	6,723	8,055	10,400
September	6,867	6,930	8,561	9,551
October	6,887	6,686	9,609	10,799
November	....	6,413	7,873	8,485
December	....	7,421	10,126	9,994
Total	....	96,101	112,638	132,916
Monthly Average	7,100*	8,008	9,387	11,076

Dun & Bradstreet Inc.

Discontinued Businesses

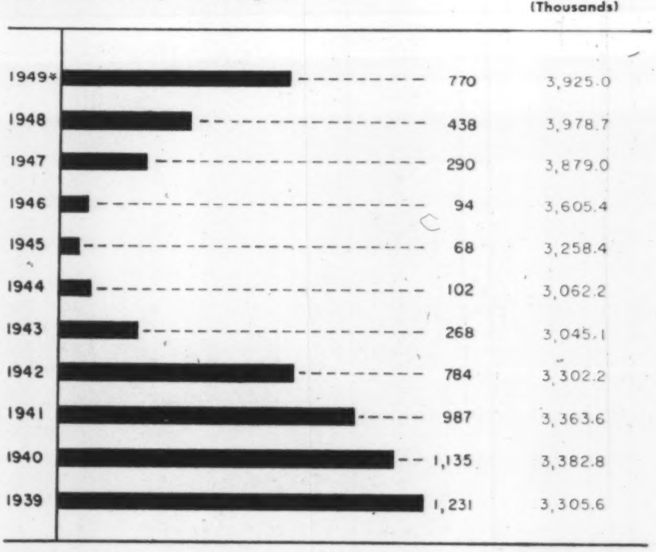
(In Thousands at End of Quarter)

	Total	Contract Construction	Manufacturing	Service
1949 (Avg.)*	126.0	...	...	...
First Qtr.	124.4	16.6	21.0	23.2
Second Qtr.	....	...	...	...
1948 (Avg.)	92.7	10.9	11.6	19.9
First Qtr.	89.2	10.5	11.9	19.2
Second Qtr.	87.0	10.7	11.1	18.4
Third Qtr.	95.5	10.9	11.5	20.7
Fourth Qtr.	102.0	12.8	15.1	20.4
Annual Averages				
1947	72.9	9.1	10.3	15.2
1946	56.6	6.7	7.6	12.8
1945	50.7	4.5	6.7	11.6
1944	49.6	4.1	5.5	11.4

U. S. Office of Business Economics

BUSINESS FAILURES

Total Monthly Averages

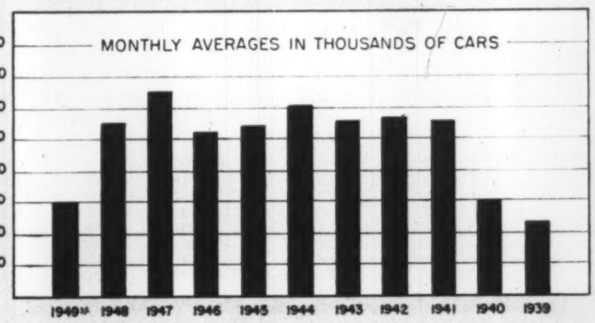


Failures—Liabilities

1949	FAILURES Total	FAILURES Construction	FAILURES Mfg., Mining	LIABILITIES Construction	LIABILITIES Mfg., Mining
January	566	53	129	$1,892,000	$8,625,000
February	685	63	170	2,476,000	15,009,000
March	849	77	215	3,018,000	17,075,000
April	877	68	229	1,519,000	24,523,000
May	776	63	202	1,434,000	11,182,000
June	828	74	215	2,476,000	13,500,000
July	719	61	188	1,845,000	10,183,000
August	810	55	221	2,272,000	16,008,000
September	732	71	183	2,148,000	9,379,000
October	802	90	181	1,989,000	11,897,000
Monthly Averages					
1949*	770	..	...	....	....
1948	438	37	123	1,301,000	10,858,000
1947	290	20	106	601,000	11,894,000
1946	94	12	39	362,000	3,241,000
1945	68	8	23	297,000	1,437,000
1944	102	14	29	198,000	1,681,000
1943	268	33	47	455,000	1,588,000
1942	784	62	125	853,000	2,600,000
1941	987	58	164	889,000	4,270,000
1940	1,135	63	205	1,109,000	5,567,000
1939	1,231	54	243	919,000	5,929,000

Dun & Bradstreet Inc.

FREIGHT CARLOADINGS



1949—By Weeks

Jan. 1	584,628	May 7	768,337	Sept. 10	624,197
Jan. 8	721,507	May 14	771,736	Sept. 17	743,022
Jan. 15	733,272	May 21	773,911	Sept. 24	661,472
Jan. 22	709,585	May 28	784,824	Oct. 1	658,128
Jan. 29	679,255	June 4	698,824	Oct. 8	574,228
Feb. 5	682,143	June 11	808,156	Oct. 15	583,913
Feb. 12	699,422	June 18	649,351	Oct. 22	589,088
Feb. 19	697,335	June 25	802,941	Oct. 29	591,317
Feb. 26	688,128	July 2	644,182	Nov. 5	578,981
Mar. 5	705,552	July 9	595,321	Nov. 12	635,823
Mar. 12	709,326	July 16	724,100	Nov. 19	758,972
Mar. 19	607,767	July 23	718,516	Nov. 26	664,555
Mar. 26	596,329	July 30	723,810	Dec. 3	693,923
Apr. 2	725,623	Aug. 6	716,824	Dec. 10	668,825
Apr. 9	757,784	Aug. 13	728,029	Dec. 17	639,723
Apr. 16	765,890	Aug. 20	731,215	Dec. 24	......
Apr. 23	769,336	Aug. 27	747,912	Dec. 31	......
Apr. 30	785,444	Sept. 3	703,930		

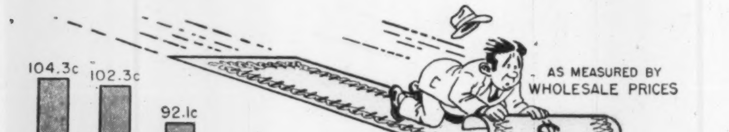
Association of American Railroads

* Estimated

Finance

METALWORKING FACTS AND FIGURES

PURCHASING POWER OF THE DOLLAR



AS MEASURED BY:

	Wholesale Prices	Consumers' Prices	Retail Food Prices
1949* ...	51.6	59.0	49.3
Jan. ..	50.1	58.5	48.8
Feb. ..	50.9	59.2	50.1
Mar. ..	50.8	59.0	49.6
Apr. ..	51.2	58.9	49.5
May ..	51.6	59.1	49.4
June ..	52.0	59.0	48.9
July ..	52.4	59.3	49.6
Aug. ..	52.6	59.2	49.4
Sept. ..	52.4	59.0	49.0
Oct. ..	52.8	59.3	49.9

Monthly Averages

	Wholesale Prices	Consumers' Prices	Retail Food Prices
1948	48.7	58.4	47.6
1947	52.8	62.8	51.5
1946	66.4	71.8	62.6
1945	76.0	77.9	71.8
1944	77.4	79.7	73.4
1943	78.0	80.9	72.4
1942	81.4	85.8	80.6
1941	92.1	95.1	94.7
1940	102.3	99.8	103.4
1939	104.3	100.6	104.9

U. S. Office of Business Economics

National Income

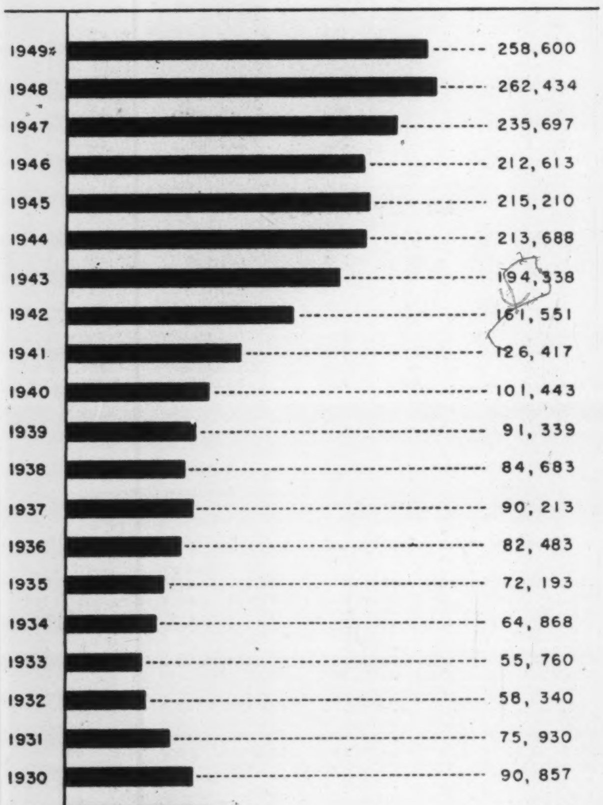
(Millions of Dollars)

1949*.	222,400
1948..	226,204
1947..	201,709
1946..	179,562
1945..	182,691
1944..	183,838
1943..	169,686
1942..	137,119
1941..	103,834
1940..	81,347
1939..	72,532
1938..	67,375
1937..	73,627
1936..	64,719
1935..	56,789
1934..	48,613
1933..	39,584
1932..	41,690
1931..	58,873
1930..	75,003
1929..	87,355

* Estimated.
Dept. of Com.

GROSS NATIONAL PRODUCT OR EXPENDITURE

(Millions of Dollars)



* Estimated. Department of Commerce

U. S. Revenues, Expenditures, Debt

Year	Net Receipts 000,000	Per Capita Receipts	Expenditures 000,000	Per Capita Expenditures	Gross Debt 000,000	Per Capita Debt
1949....	$38,246	$256.68	$40,057	$268.83	$252,770	$1696.44
1948....	44,746	306.24	39,326	269.14	252,292	1726.68
1947....	44,703	311.77	42,505	296.44	258,376	1801.94
1946....	43,037	305.25	65,018	461.17	269,422	1910.97
1945....	46,456	332.78	100,404	719.25	258,682	1853.01
1944....	44,149	319.92	93,743	679.29	201,003	1455.52
1943....	22,281	163.25	78,182	572.83	136,696	1001.55
1942....	12,799	95.25	32,491	241.80	72,422	537.35
1941....	7,607	57.29	12,774	74.16	48,961	367.54
1940....	5,387	44.09	9,127	70.65	42,967	325.63
1939....	5,164	43.21	8,765	70.65	40,445	308.34
1938....	5,854	47.89	7,304	59.70	37,167	285.43
1937....	5,028	40.93	8,281	62.69	36,427	281.82
1936....	4,115	32.17	9,068	69.41	33,545	261.20
1935....	3,800	29.88	7,583	58.00	28,701	225.07
1934....	3,115	24.64	6,370	56.19	27,053	213.65
1933....	2,079	16.54	4,325	40.91	22,538	179.21
1932....	2,005	16.06	4,948	41.28	19,487	155.93
1931....	3,190	25.70	4,091	32.99	16,801	135.37
1930....	4,177	33.01	3,994	32.42	16,185	131.49
1929....	4,033	33.19	3,848	31.67	16,931	139.40
1928....	4,042	33.73	3,643	30.40	17,604	146.69
1927....	4,129	34.94	3,493	29.56	18,510	156.04
1926....	3,962	33.98	3,584	30.76	19,643	167.70
1925....	3,780	32.91	3,529	30.73	20,516	177.82
1924....	4,012	35.44	3,507	30.98	21,251	186.86
1923....	4,007	35.93	3,697	33.15	22,349	200.10
1922....	4,109	37.40	3,795	34.54	22,964	208.97
1921....	5,625	51.98	5,538	51.18	23,976	221.09
1920....	6,695	62.83	6,482	60.84	24,297	228.32
1919....	5,152	49.07	18,523	176.40	25,482	240.09
1918....	3,664	35.38	12,697	122.58	12,243	115.65
1917....	1,124	11.00	1,978	19.36	2,975	28.57
1916....	782	7.77	734	7.29	1,225	11.96
1915....	698	7.03	761	7.66	1,191	11.83

Annual Statements of the Treasury

Corporate Income, Taxes, Dividends

(All Industries—Millions of Dollars)

	Income Before Taxes	Taxes†	Income After Taxes	Dividend Payments	Undistributed Income
1949§					
1st Qtr. ..	29,400	11,500	17,900	....	.....
2nd Qtr. ..	26,400	10,600	15,800	....	.....
1948......	34,793	13,619	21,174	7,932	13,242
1947......	31,602	12,511	19,091	7,018	12,073
1946......	23,560	9,620	13,940	5,808	8,132
1945......	19,717	11,215	8,502	4,699	3,803
1944......	24,333	13,525	10,808	4,680	6,128
1943......	25,052	14,406	10,646	4,493	6,153
1942......	21,098	11,665	9,433	4,297	5,136

---

† Federal and state corporate income and excess profits tax liability.
§ Seasonally adjusted quarterly totals at annual rates.
Department of Commerce.

Fuel-Power-Raw Materials

METALWORKING FACTS AND FIGURES

Electricity Output

Millions of Kilowatt-hours

1949—By Weeks

Jan.8	5,742
Jan.15	5,727
Jan.22	5,769
Jan.29	5,810
Feb.5	5,778
Feb.12	5,722
Feb.19	5,650
Feb.26	5,559
Mar.5	5,552
Mar.12	5,531
Mar.19	5,496
Mar.26	5,404
Apr.2	5,378
Apr.9	5,360
Apr.16	5,343
Apr.23	5,326
Apr.30	5,304
May7	5,284
May14	5,257
May21	5,255
May28	5,270
June4	5,018
June11	5,300
June18	5,373
June25	5,466
July2	5,410
July9	4,982
July16	5,342
July23	5,462
July30	5,518
Aug.6	5,466
Aug.13	5,530
Aug.20	5,579
Aug.27	5,523
Sept.3	5,544
Sept.10	5,258
Sept.17	5,579
Sept.24	5,556
Oct.1	5,521
Oct.8	5,450
Oct.15	5,481
Oct.22	5,430
Oct.29	5,433
Nov.5	5,435
Nov.12	5,435
Nov.19	5,644
Nov.26	5,537
Dec.3	5,743
Dec.10	5,881
Dec.17	5,997
Dec.24	.....
Dec.31	.....

TOTAL YEARLY GENERATION

by Plants Contributing to Public Supply

1949*	285,000
1948	282,594
1947	255,739
1946	223,178
1945	222,486
1944	228,189
1943	217,759
1942	185,979
1941	164,788
1940	141,837
1939	127,642

Edison Electric Institute and Federal Power Commission

Coke Production

Net Tons

1949	Oven	Beehive	Total
Jan.	6,076,008	623,756	6,699,764
Feb.	5,475,421	623,301	6,098,722
Mar.	5,957,666	437,197	6,394,863
Apr.	5,760,570	632,943	6,393,513
May	5,798,230	527,525	6,325,755
June	5,242,437	267,938	5,510,375
July	4,910,614	24,073	4,934,687
Aug.	5,142,392	45,262	5,187,654
Sept.	4,952,018	30,025	4,982,043
Oct.	1,727,258	8,849	1,736,107
Nov.	....	......	....
Dec.	....	......	....

YEARLY TOTALS

	Oven	Beehive	Total
1948	67,419,104	6,331,695	73,750,799
1947	66,581,534	6,711,091	73,292,625
1946	53,929,447	4,568,401	58,497,848
1945	62,094,288	5,213,893	67,308,181
1944	67,064,795	6,973,022	74,037,817
1943	63,742,676	7,933,387	71,676,063
1942	62,294,909	8,274,035	70,568,944
1941	58,482,422	6,704,156	65,186,578
1940	54,014,309	3,057,825	57,072,134
1939	42,882,313	1,444,328	44,326,641

U. S. Bureau of Mines

Iron and Steel Scrap

Thousands of Net Tons

	Consumption		Consumers' Stocks†	
	1949	1948	1949	1948
January	5,759	5,294	6,030	3,976
February	5,346	5,082	5,882	3,936
March	5,925	5,875	5,842	4,064
April	5,223	5,217	5,771	4,571
May	4,968	5,588	5,745	4,654
June	4,398	5,401	5,824	4,922
July	3,800	5,050	5,748	5,118
August	4,757	5,309	5,351	5,389
September	4,631	5,410	4,824	5,601
October	....	5,783	....	5,675
November	....	5,656	....	5,792
December	....	5,615	....	6,065

MONTHLY AVERAGES

	Consumption		Consumers' Stocks†
1949*	4,300	1949*	5,420
1948	5,440	1948	4,980
1947	5,072	1947	3,966
1946	4,124	1946	3,757
1945	4,683	1945	4,073
1944	5,112	1944	5,268
1943	5,138	1943	6,170
1942	5,022	1942	4,550
1941	4,934	1941	4,529
1940	3,711	1940	5,472
1939	3,027	1939	5,310

U. S. Bureau of Mines

† End of month

Fuel Oil Consumption in Steel Industry

Thousands of Gallons

	Melting Furnaces	Heating, Annealing, etc.	Total
1948	1,533,129	662,410	2,195,539
1947	1,511,945	655,883	2,167,828
1946	1,225,904	557,276	1,783,180
1945	1,402,527	606,130	2,008,657
1944	1,427,090	632,945	2,060,035
1943	1,472,540	636,885	2,109,425

American Iron & Steel Institute

Fluorspar

1949—NET TONS

Qtrs.	Production	Imports	Consumption	Stocks†
1st	63,263	29,829	105,375	172,072
2nd	66,022	29,609	90,596	173,871
3rd	54,196	16,261	81,564	163,534

YEARLY TOTALS

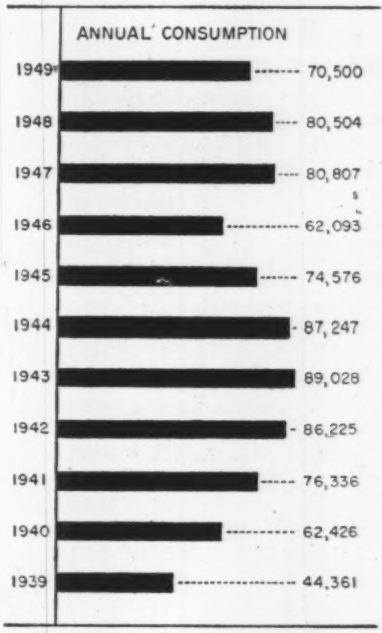
	Production	Imports	Consumption	Stocks†
1948	336,000	111,626	406,269	184,213
1947	343,700	78,379	376,138	147,251
1946	277,300	29,488	303,190	117,620
1945	325,200	100,726	356,090	123,011
1944	413,700	92,499	410,170	117,467

U. S. Bureau of Mines.

† End of period.

IRON ORE

Thousands of Gross Tons



1949-1948 By Months

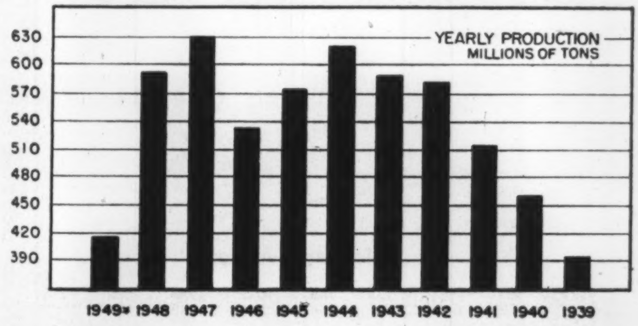
Thousands of Gross Tons—

Stocks at Lake Erie Docks and Furnaces at end of month

	Consumption		—Stocks—	
	1949	1948	1949	1948
Jan.	7,590	7,057	31,904	29,081
Feb.	6,992	6,441	24,981	22,628
Mar.	7,735	6,634	17,308	16,022
Apr.	7,322	4,976	17,803	17,125
May	7,277	6,657	21,508	22,058
June	6,249	6,577	27,696	26,965
July	5,258	6,479	35,064	32,611
Aug.	5,711	7,036	40,811	37,081
Sept.	5,541	6,965	45,356	40,923
Oct.	877	7,273	47,017	43,883
Nov.	3,520	7,058	44,786	45,160
Dec.	....	7,351	.....	39,460
Total	....	80,504	.....	.....

Lake Superior Iron Ore Association

BITUMINOUS COAL OUTPUT



1949—By Weeks

Millions of Tons

Jan. 8	11.6
Jan. 15	11.8
Jan. 22	11.5
Jan. 29	10.5
Feb. 5	11.4
Feb. 12	11.4
Feb. 19	10.9
Feb. 26	10.9
Mar. 5	10.3
Mar. 12	10.3
Mar. 19	3.0
Mar. 26	2.4
Apr. 2	9.7
Apr. 9	11.3
Apr. 16	11.4
Apr. 23	11.4
Apr. 30	11.6
May 7	11.2
May 14	11.1
May 21	11.1
May 28	11.3
June 4	10.0
June 11	13.0
June 18	2.2
June 25	11.8
July 2	1.3
July 9	4.7
July 16	6.6
July 23	7.0
July 30	7.4
Aug. 6	7.5
Aug. 13	8.0
Aug. 20	7.5
Aug. 27	7.9
Sept. 3	8.0
Sept. 10	6.0
Sept. 17	8.4
Sept. 24	2.0
Oct. 1	1.8
Oct. 8	2.2
Oct. 15	2.4
Oct. 22	2.5
Oct. 29	2.8
Nov. 5	2.7
Nov. 12	7.1
Nov. 19	14.0
Nov. 26	12.6
Dec. 3	9.2
Dec. 10	9.2
Dec. 17	...
Dec. 24	...
Dec. 31	...

U. S. Bureau of Mines

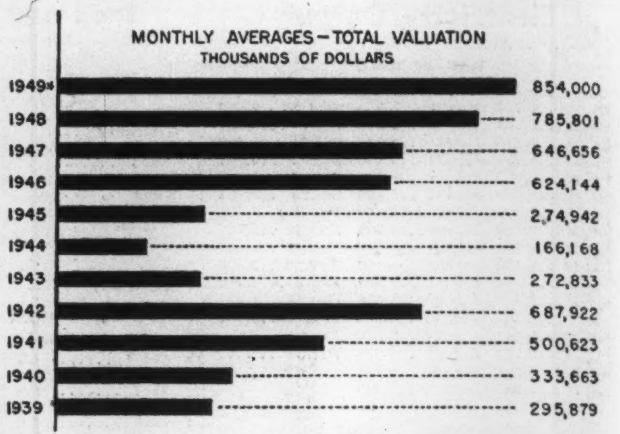
* Estimated

CONSTRUCTION VALUATION

37 States—Thousands of Dollars

	Total 1949	Total 1948	Public Works, Utilities 1949	Public Works, Utilities 1948	Residential and Non-residential 1949	Residential and Non-residential 1948
Jan.	482,984	615,206	101,973	136,564	381,011	478,642
Feb.	568,467	681,967	153,499	177,322	414,968	504,645
Mar.	747,619	689,763	168,408	164,283	579,211	525,480
Apr.	842,586	873,882	222,391	184,675	620,195	689,207
May	880,344	970,789	213,463	205,038	666,881	765,751
June	945,676	935,188	283,963	215,691	706,713	719,497
July	943,560	962,685	252,685	217,882	690,875	744,803
Aug.	905,748	854,091	234,283	207,791	671,465	646,300
Sept.	1,093,724	762,192	223,129	202,672	870,595	559,520
Oct.	1,061,751	778,606	203,964	165,492	857,787	613,114
Nov.	957,761	611,216	256,423	106,873	701,338	504,343
Dec.	......	694,023	......	170,878	......	523,145
Total	......	9,429,608	......	2,155,161	......	7,274,447

F. W. Dodge Corp.

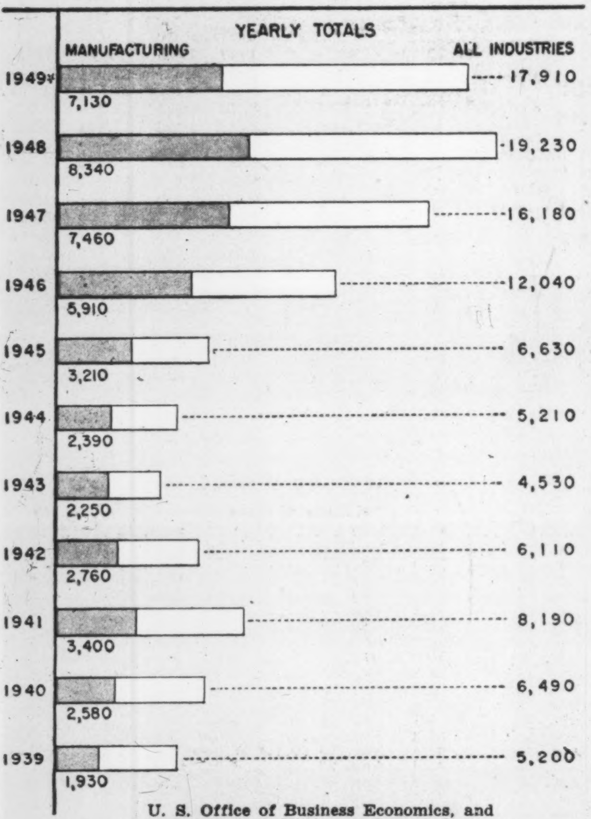


NEW PLANT AND EQUIPMENT EXPENDITURES

Millions of Dollars

(Figures are rounded and will not necessarily add to totals)

	Manufacturing 1949	Manufacturing 1948	All Industries 1949	All Industries 1948
1st Quarter	1,850	1,800	4,460	4,170
2nd Quarter	1,880	2,140	4,660	4,820
3rd Quarter	1,690	2,090	4,360	4,830
4th Quarter	1,710	2,320	4,430	5,410
Total	7,130	8,340	17,910	19,230



U. S. Office of Business Economics, and Securities & Exchange Commission

New Houses Started

(Permanent Nonfarm Dwellings—Cost Estimated in Thousands of Dollars)

	Number 1949	Number 1948	Cost 1949	Cost 1948
January	50,000	53,500	$373,940	$383,563
February	50,400	50,100	382,684	368,915
March	69,400	76,400	529,211	562,572
April	88,300	99,500	666,383	748,848
May	95,400	100,300	732,604	769,093
June	95,500	97,800	719,699	768,817
July	96,100	95,000	709,571	750,843
August	99,000	86,600	735,433	719,080
September	100,000	82,200	......	641,355
October	100,000	73,400	......	573,888
November	93,000	63,600	......	498,040
December	.....	52,900	......	414,147
Total	1,000,000*	931,300	......	$7,199,161

Yearly Totals

	Number	Cost		Number	Cost
1949*	1,000,000	$	1944	141,800	$ 495,054
1948	931,300	7,199,161	1941	706,100	2,825,895
1947	849,000	5,642,798	1933	93,000	285,446
1946	670,500	3,769,767	1925	937,000	4,475,000

Fabricated Structural Steel

Orders placed—Tons

	1949	1948	1947
Jan.	130,418	160,634	104,973
Feb.	108,764	130,119	125,881
Mar.	149,079	213,123	149,634
Apr.	98,802	154,082	161,338
May	116,975	141,764	112,954
June	96,952	162,367	103,273
July	126,255	177,687	153,540
Aug.	98,953	172,485	146,382
Sept.	120,373	180,422	134,630
Oct.	158,120	162,739	159,132
Nov.	......	140,794	132,916
Dec.	......	169,553	144,103
Total	......	1,965,769	1,628,756

Yearly Totals	
1948	1,965,769
1947	1,628,756
1946	1,726,057
1945	1,392,608
1944	786,096
1943	707,480
1942	1,762,453
1941	2,296,954
1940	1,748,144
1939	1,305,049
1938	1,256,639
1937	1,628,641
1936	1,609,016
1929	3,597,825

American Institute of Steel Construction

Industrial Building Cost Index

(1914=100)

	1949	1948	1947	1946	1945
First Quarter	319	310	304	258	232
Second Quarter	313	325	300	270	232
Third Quarter	307	327	304	287	232
Fourth Quarter	...	323	307	300	248

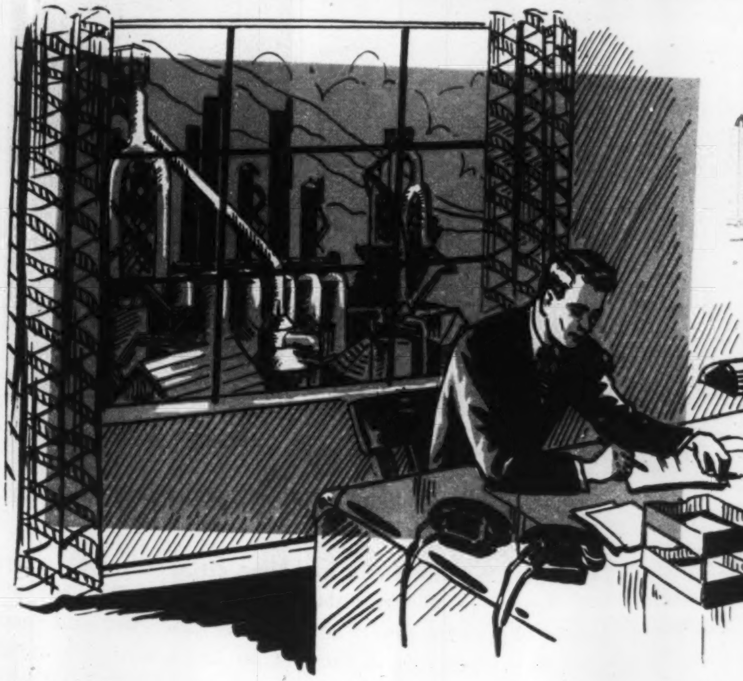
Monthly Averages

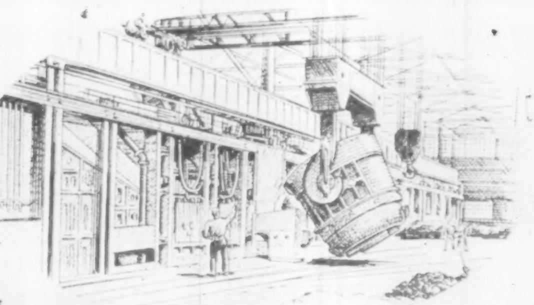
1949*	311	1946	279	1943	225	1940	193	1937	199
1948	321	1945	236	1942	223	1939	190	1936	184
1947	304	1944	227	1941	208	1938	191	1935	177

Abertaw Co.

*Estimated.

when you buy specify **BAKER'S MAGDOLITE**





the original dead-burned dolomite is still the best refractory!

MAGDOLITE helps produce:

- uniform ingots
- in greater numbers
- at lower fuel costs
- with less defective material
- at distinct savings to you

BAKER'S MAGDOLITE possesses superior chemical, physical, and mineralogical composition. Its grain-size particles are properly burned. It assures you of *minimum* maintenance and repairs. In economy, strength, and quality, it knows no peer as an open hearth and electric furnace Refractory.

Write for complete details about *Baker's Magdolite.*

THE J. E. BAKER COMPANY

MAIN OFFICES · YORK, PENNSYLVANIA
Plants · Billmeyer, Pa., and
Millersville, Ohio

Baker's Magdolite means Better Manufacturing

Men of Industry

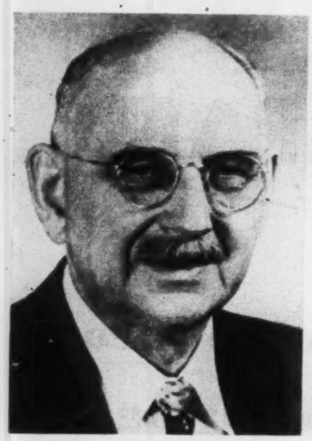
L. L. Lewis has been elected secretary and director of **Carnegie-Illinois Steel Corp.,** Pittsburgh, subsidiary of U. S. Steel Corp., and **C. E. Stewart** has been elected assistant secretary. At the same time announcement was made of the resignation of **James W. Hamilton,** secretary and director of Carnegie-Illinois since 1930, who asked to be relieved of these responsibilities so that, prior to his retirement, he may devote his full time to other duties. Mr. Lewis started with U. S. Steel in 1939 in the legal department of U. S. Steel Corp. of Delaware. He was general attorney in charge of labor relations when he left the Delaware corporation in 1948 to become general attorney of Carnegie-Illinois, the position he held before election to his new office. Mr. Stewart joined the legal department of Carnegie-Illinois in 1943, and has had legal responsibilities with the company since that time.

—o—

General Railway Signal Co., Rochester, N. Y., announces promotions as follows: **Herbert W. Chamberlain,** vice president in charge of sales, becomes executive vice president of the company. **Oscar S. Field,** director of engineering and research, will be vice president in charge of engineering. **Arthur E. Heimbach,** western manager, with headquarters in Chicago, transfers to the Rochester office as vice president. **Percy W. Smith,** eastern manager, with headquarters in New York, also becomes a vice president.

—o—

George F. Noltein, since 1937 chief engineer of **Superior Engine Division,** Springfield, O., National Supply Co., has been appointed director of research for the division, and **Harvey W. Hanners** succeeds Mr. Noltein as chief engineer. With long experience as engineer and designer in the diesel engine field in Europe and the United States, Mr. Noltein joined National Supply's Superior Engine Division in 1927. Mr. Hanners, who has been associated with the Superior Engine Division since 1941, has been assistant to the chief engineer for the last two years.


GEORGE F. NOLTEIN

HARVEY W. HANNERS

L. L. LEWIS

LEYSHON W. TOWNSEND

—o—

Leyshon W. Townsend has been elected vice president of **American Cladmetals Co.,** Carnegie, Pa. He will be in charge of manufacturing, engineering and product development. A pioneer in the cladmetal industry, Mr. Townsend has formerly been associated with Lukens Steel Co. and Jessop Steel Co. He has been assistant to the president of American Cladmetals since last year.

—o—

Roger D. Anderson is the new sales representative in Nebraska and western Iowa for **National Radiator Co.,** Johnstown, Pa. He has established offices at 3409 Martin Ave., Omaha, Nebr. Mr. Anderson spent several years with two Nebraska manufacturing firms as a sales engineer and then as a production engineer. During the past year he has been operating his own business as partner of Anderson Bros. Engineering Co., Omaha.

—o—

Harold B. Schott has been appointed director of sales promotion, **Brown & Sharpe Mfg. Co.,** Providence, R. I. He formerly was in charge of sales of the pump division.

—o—

T. A. Boyd, General Motors Corp. research laboratories consultant, one of the co-discoverers of the effects of compounds of lead on internal combustion engines, will be awarded the **Horning Memorial Medal** Jan. 11 by the **Society of Automotive Engineers** at the Book-Cadillac Hotel, Detroit. The presentation will take place at the 1950 annual meeting of the society, which will be held during the week of Jan. 9. Mr. Boyd's paper "Pathfinding in Fuels and Engines" won for him this award.

—o—

Clarence J. Krueger has been appointed production manager for the paint division of **Pittsburgh Plate Glass Co.,** Pittsburgh. Associated with the firm since 1927, Mr. Krueger has served as assistant divisional

Large Stocks

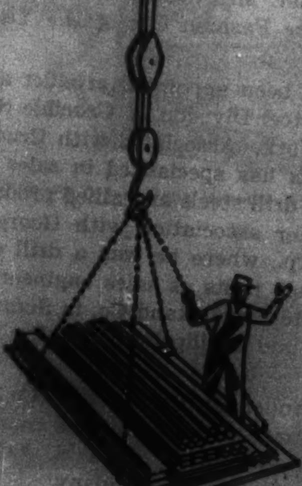
Accurate Cutting

Steel—
Certified
Quality

Quick Shipment

Engineering Aid

Personal Service



PRINCIPAL PRODUCTS . . . Carbon, Alloy and Stainless Steels—
Bars, Structurals, Plates, Sheets, Tubing, Machinery & Tools, etc.

RYERSON STEEL

RYERSON CERTIFIED STEELS

Joseph T. Ryerson & Son, Inc. Plants at: New York • Boston • Philadelphia • Detroit • Cincinnati
Cleveland • Pittsburgh • Buffalo • Chicago • Milwaukee • St. Louis • Los Angeles • San Francisco

Since 1842

MEN OF INDUSTRY

DUNCAN A. BROWNLIE

HARRY L. BIALOCK

GEORGE W. WALKER

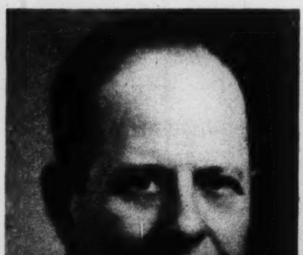
director of Ditzler Color Division for the last three years. As production manager for the paint division he will have headquarters in Pittsburgh.

—o—

Duncan A. Brownlie has been appointed industry manager of **Reynolds Metals Co.'s** building products division, Louisville. He has been regional manager for the division on the West Coast, with headquarters in San Francisco. Before joining Reynolds organization in 1947, Mr. Brownlie was employed by Sixth Army Engineers as secretary of Regional Review Board to co-ordinate postwar construction plans. For 12 years prior to Army service he had extensive experience in building products sales and distribution with Johns-Manville Corp. During the latter part of this period he was special representative for the company in the Northwest.

—o—

John E. Payne has been appointed manager, central district, **Westinghouse Electric Corp.,** Pittsburgh. He will have complete supervision of the Westinghouse apparatus business in the Pittsburgh, Cleveland, Detroit and Cincinnati areas, and will make his headquarters in Pittsburgh. Mr. Payne joined Westinghouse immediately after graduating from Alabama Polytechnic Institute in 1925. In 1947 he was appointed headquarters industrial sales manager, and in October of that year was appointed manager of all industry sales departments.



JOHN E. PAYNE

ROBERT W. PERSONS

Harry L. Bialock, manager of sales of **National Tube Co.** at Atlanta, has been promoted to manager of sales of the tubing specialties division of this U. S. Steel Corp. subsidiary. He will make his headquarters at Gary, Ind., and succeeds **David T. Marvel,** resigned. **Charles J. Lundvall,** now a salesman in the New York district office of National Tube, has been appointed manager of sales at Atlanta to succeed Mr. Bialock. Mr. Bialock joined National Tube in 1936, when he became a salesman in the New Orleans office. Later he was appointed manager of sales in that office. He was a tubing specialty representative in Washington during the war, holding that position until he became sales manager in Atlanta.

—o—

George W. Walker, industrial designer of Detroit, has been engaged by **United States Radiator Corp.,** Detroit, and Pacific Steel Boiler Division. Mr. Walker and his staff have begun restyling all United States and Pacific heating products. An internationally-known industrial designer, Mr. Walker was awarded the Gold Medal for "The Fashion Car of the Year."

—o—

Robert W. Persons has been appointed product sales manager of the Drill Steel Division of **Crucible Steel Co. of America,** New York. Associated with Crucible since 1930, Mr. Persons has specialized in sales and application services for drill steels and allied products. He joined Crucible after association with George J. Atwell Foundation Corp., where he was a drill engineer, and previously held posts as sales engineer and in production work at Ingersoll-Rand Co. in Scranton, Pa., Knoxville, Tenn., and Phillipsburg, N. J.

—o—

H. N. Eidswick, controller of **Pacific Can Co.,** San Francisco, has been named treasurer of the company, succeeding **Edward F. Euphrat. Jack S. Euphrat** has been elected a director of the company.

—o—

Federal Machine & Welder Co., Warren, O., announces appointment of **Harlan W. Burbank** as district representative for southern Ohio, the western part of West Virginia and for Kentucky. He has represented the company in Mexico for the last several years, and that office will continue in operation under the

LOMBARD COMBINES THESE VITAL ENGINEERING ELEMENTS

RESEARCH AND DESIGN

ENGINEERING AND MACHINE CONSTRUCTION

CHOOSE ONE OR ALL
To Solve Your Particular Problem

RESEARCH AND DESIGN . . .

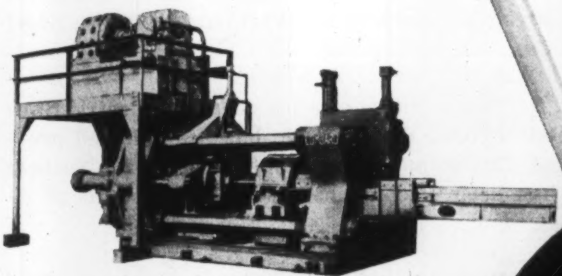
Give us your toughest engineering problem and we'll develop the practical, efficient method or process for your profitable production.

ENGINEERING AND MACHINE CONSTRUCTION . . .

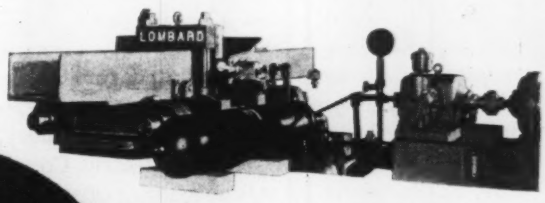
Whether it's a mechanical punch or forming press . . . a hydraulic extrusion press or intensifier system . . . complete plant design including construction and installation of industrial buildings and machinery, Lombard "Packaged Engineering" embraces the entire responsibility.

FIELD SERVICE . . .

This is one of the *Pluses* Lombard offers. Lombard engineers stay on the job until equipment is in complete and satisfactory operation.

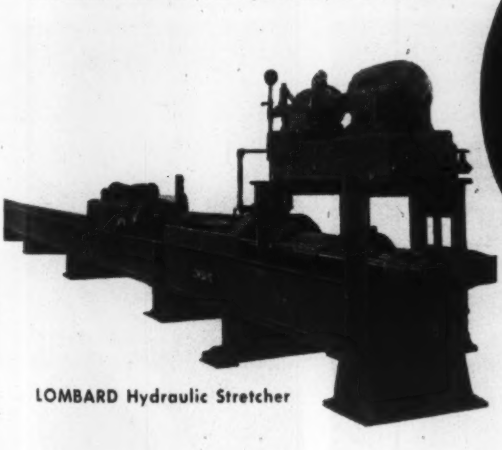


LOMBARD Four-Column Hydraulic Extrusion Press



LOMBARD Hydraulic Test Bar Shear

FIELD SERVICE



LOMBARD Hydraulic Stretcher

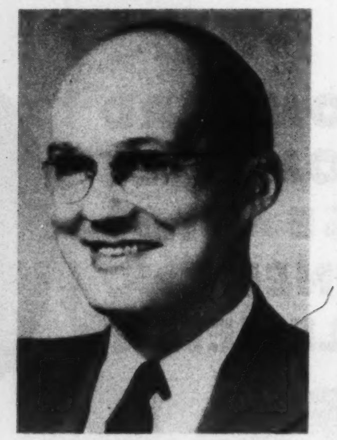
INVESTIGATE LOMBARD
Packaged Engineering
TODAY!

LOMBARD CORPORATION
ENGINEERS AND DESIGNERS
EMPIRE BUILDING • YOUNGSTOWN 3, OHIO

EQUIPMENT MANUFACTURED BY UNITED ENGINEERING AND FOUNDRY CO., PITTSBURGH, PA.

MEN OF INDUSTRY

EMIL GAIRING



ROBERT FULTON

HARRY S. THOMPSON

name of Burbank Associates Inc., with **E. L. Stinyard** in charge. Mr. Burbank, under Burbank Associates Inc., will maintain an office in Cincinnati.

—o—

Emil Gairing, president, Gairing Tool Co., Detroit, has been re-elected president of the **Cutting Tool Manufacturers Association,** Detroit. Also re-elected as vice president was **Norman Lawton,** works manager, Star Cutter Co., Detroit, while **R. S. Spencer,** president, Detroit Boring Bar Co., was re-elected as treasurer. Re-elected directors for a three-year term were Emil Gairing; **E. A. Goddard,** president, Goddard & Goddard Co., Detroit; **D. E. Van Deusen,** president and general manager, Kelly Reamer Co., Cleveland. **Melvin L. Weinberg,** sales manager, Putnam Tool Co., Detroit, was also elected to the board of directors for a three-year term.

—o—

Robert Fulton has been appointed superintendent, plastic metals division plant, **National Radiator Co.,** Johnstown, Pa., to supervise all phases of the plastic metal division production of metal powders which are used in the field of powder metallurgy, electronics and chemistry. He has been affiliated for the last four years with Indiana Steel Products Co. as production manager of the eastern division at Chauncey, N. Y., and was earlier with General Electric Co., Schenectady, N. Y., where he was in charge of engineering of what is now the metallurgical products division of the chemical department.

—o—

Howard I. Young, president, American Zinc, Lead & Smelting Co., St. Louis, has been re-elected president of the **American Mining Congress.** This will mark his 17th year as president. He served as director of the War Production Board's Minerals Division during World War II. Mr. Young is a past president of American Zinc Institute. Re-elected as vice presidents of American Mining Congress are: **Andrew Fletcher,** president, St. Joseph Lead Co., New York; and **Donald A. Callahan,** president, Callahan Consolidated Mines Inc., Wallace, Idaho. **W. J. Jenkins,** president, Consolidated Coal Co., St. Louis, was elected to a vice presidency to succeed **James D. Francis,** chairman of the board, Island Creek Coal Co., Huntington, W. Va. **Julian D. Conover,** Washington, was re-elected secretary.

Harry S. Thompson has been appointed general works manager of **American Furnace & Foundry Co.** and **American Boiler & Foundry Co.,** Milan, Mich. Mr. Thompson joins the Milan organization with a long background in foundry management and production which includes planning and supervision of a number of foundry reorganization, expansion and modernization programs from coast to coast. As general works manager in the Milan foundry, Mr. Thompson will supervise production of gray iron castings for the automotive, tractor, laundry equipment, heating, machine tool and other industries, and also will supervise the company's complete line of domestic heating equipment.

—o—

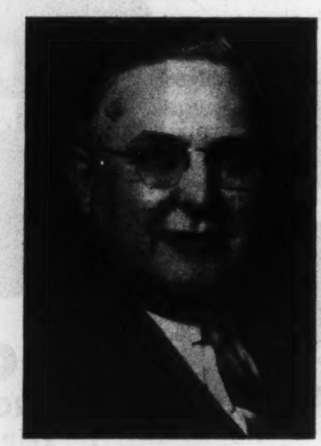
William Weiss, William Weiss Steel Co., Chicago, has been named president of the **Steel Products Warehouse Association of Chicago. P. A. Riskind,** Chicago Metals Co., is vice president. Named, respectively, as secretary and treasurer are **Dan Friedman,** Friedman Bros. Steel Co., and **Hyman Greenburg,** Western Sheet Steel Co.

—o—

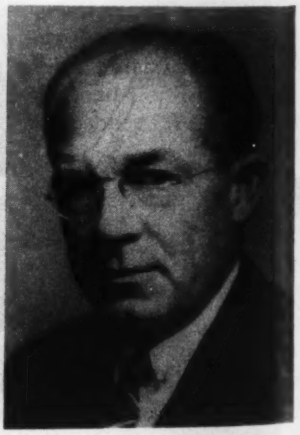
S. W. Rolph, executive vice president of **Electric Storage Battery Co.,** Philadelphia, has been elected president of the company. He succeeds **R. C. Norberg** who has been elected chairman of the board of directors.

—o—

John V. Pooler has been appointed manager of all



HOWARD I. YOUNG



S. W. ROLPH

Zoom along with Chief Keokuk and his Princess Wenatchee! That's what many foundry and steel plants have been doing for many years . . . because they have found that *Keokuk never lets them down!* This dependability plus the dependability of Keokuk Electro-Silvery with its accurate percentages of silicon, iron and alloys . . and its uniformity in size and weight . . . makes *Keokuk the best buy!*

ZOOM ALONG WITH KEOKUK...

WENATCHEE
KEOKUK
CHIEF KEOKUK SPECIAL

STEEL PLANTS

60 lb. Keokuk Electro-Silvery pigs are used by many leading steel plants for blocking the open hearth heat. They produce excellent results for an equal distribution of silicon and for the best temperature melt-down.

FOUNDRIES

30 lb. Keokuk Electro-Silvery pigs are charged into the cupola mechanically or by hand. Easily broken into two or more pieces and measured by weight. 12½ lb. Keokuk Electro-Silvery piglets may be charged by count, eliminating weighing operations. Both sizes are available in regular or alloy analysis.

All three sizes may be handled by magnet!

KEOKUK

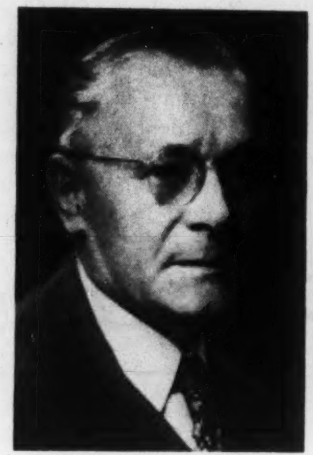
electro-silvery

Keokuk metallurgists can help you with your metal and addition problems. Write to us now for this no obligation service or for complete information on Keokuk Electro-Silvery!

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA
Wenatchee Division, Wenatchee, Washington
SALES AGENTS
Miller and Company, 332 S. Michigan Avenue, Chicago 4, Illinois
Cincinnati 2, Ohio, 3504 Carew Tower. St. Louis 1, Mo., 407 N. Eighth St.

MEN OF INDUSTRY


ERNEST W. KRAUSE

ARTHUR EICHELKRAUT

ROLLIN P. JOHNSON

plants and quarries and supervisor of construction and shipping activities for **Kaiser Industries Inc.**, Oakland, Calif. Mr. Pooler formerly was superintendent of the company's gypsum plant at Long Beach, Calif. He is succeeded in that position by **John O. Lewis.**

—o—

Walter M. Barber, who has devoted 35 years to sales promotional activities, will on Jan. 3 become sales promotion and advertising manager of **Perfection Stove Co.,** Cleveland, a newly created post. Since early in 1942 Mr. Barber has been manager of Perfection's Cleveland district sales office. He joined the company in 1915.

—o—

Alton J. Hole has been appointed plant manager of the Buffalo pressed steel unit of **Ford Motor Co.** A veteran of 24 years in the automotive industry, he has been serving as general manager of Highland Park operations which include truck and tractor assembly lines and various manufacturing activities. He began his career as a die maker with Briggs Mfg. Co. and from 1927 until 1931 was employed at the Rouge plant of Ford. He left to join Budd Co. and later went with General Motors. He was stamping plant superintendent of the Pontiac Division of that corporation when he returned to Ford. **Edgar F. Wait,** who has been serving as assistant plant manager at Highland Park, has been named acting plant manager.

ALTON J. HOLE

ROBERT C. HOOD

Wheeling Machine Products Co., Wheeling, W. Va., announces completion of the reorganization of its executive personnel. **Ernest W. Krause** is president, **Arthur Eichelkraut** is vice president, and **Rollin P. Johnson** is secretary-treasurer. Other members of the executive group include **W. Robert Johnston,** director of personnel and purchasing agent; and **Charles E. Ray,** plant superintendent.

—o—

National Slag Association, Washington, announces the following officers elected for 1950: President, **E. L. Flad,** manager, slag division, Carnegie-Illinois Steel Corp.; vice president, **C. A. Barinowski,** vice president, Birmingham Slag Co.; managing director, **E. W. Bauman,** Washington; and treasurer, **W. S. Shaw,** Washington.

—o—

Jonas H. Ingram, Admiral, U. S. Navy, ret., has become associated with **Reynolds Metals Co.,** Louisville, as executive representative. He was commander-in-chief of the Atlantic fleet at the close of World War II. Mr. Ingram's home is in Coronado, Calif., where he will continue to reside.

—o—

Die-Mold Corp., Milwaukee, designer and builder of plastic molds, die casting dies and permanent molds, has appointed **Adolph D. Mandl,** formerly with Allied Chemical & Dye Corp. and General Aniline & Film Corp., New York, as manager of its plant. **Sig Mandl** continues as vice president and general manager.

—o—

Robert C. Hood has been elected president of **Ansul Chemical Co.,** Marinette, Wis., succeeding his brother, **F. James Hood,** who died in November. The new president was named vice president less than two years ago, and has been associated with Ansul for ten years. Returning from service after World War II, Robert Hood became secretary in 1945 and vice president in 1948. Ansul Chemical Co. has also created a dual vice presidency, and **Leonard C. McKesson,** sales director, has been named vice president in charge of sales, and **Arthur C. Pope,** who has spent 16 years as production manager of Ansul's sulphur dioxide and methyl chloride plants, has been promoted to vice president in charge of manufacturing.

STANDARDS and SPECIALS by the *Millions*

THE FERRY CAP & SET SCREW CO.

2159 SCRANTON ROAD • • • CLEVELAND 13, OHIO

"SHINYHEADS"

America's Best Looking Cap Screw

Made of high carbon steel — AISI C-1038 — to standards for Full Finished hexagon head cap screws — bright finish. Heads machined top and bottom. Hexagon faces clean cut, smooth and true, mirror finish. Tensile strength 95,000-110,000 p.s.i. Carried in stock.

"HI-CARBS"

Heat Treated Black Satin Finish

Made of high carbon steel — AISI C-1038. Furnished with black satin finish due to double heat treatment. Hexagon heads die made, not machined. Points machine turned; flat and chamfered. Tensile strength 130,000-160,000 p.s.i. Carried in stock.

"LO-CARBS"

Made of AISI C-1018 steel — bright finish. For use where heat treatment is not required and where ordinary hexagon heads are satisfactory. Hexagon heads die made to size — not machined. Points machine turned. Tensile strength 75,000-95,000 p.s.i. Carried in stock

SET SCREWS

Square head and headless — cup point. Case hardened. Expertly made by the pioneers in producing Cup Point Set Screws by the cold upset process. Cup points machine turned. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

"SHINYLAND" STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered machined point. Nut end, oval point. Land between threads shiny, bright, mirror finish. Carried in stock.

ADJUSTING SCREWS

Valve tappet adjusting screws — Hexagon head style — to blue print specifications — hexagon head hard; polished if specified — threads soft to close tolerance — points machine turned; flat and chamfered.

CONNECTING ROD BOLTS

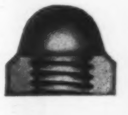
Made of alloy steel — heat treated — threads rolled or cut — finished to extremely close thread and body tolerances — body ground where specified. Expertly made by the pioneers in producing connecting rod bolts by the cold upset process.

SPRING BOLTS

Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

FERRY PATENTED ACORN NUTS

For ornamental purposes. Steel insert — steel covered. Finish: plain, zinc plated, cadmium plated. Size: 9/16", 3/4", 15/16" across the flats.



Tapped 1/4" to 3/4" inclusive. Cross section of Ferry patented acorn nut, showing how steel hexagon nut fits snugly into shell.

Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

STANDARDS

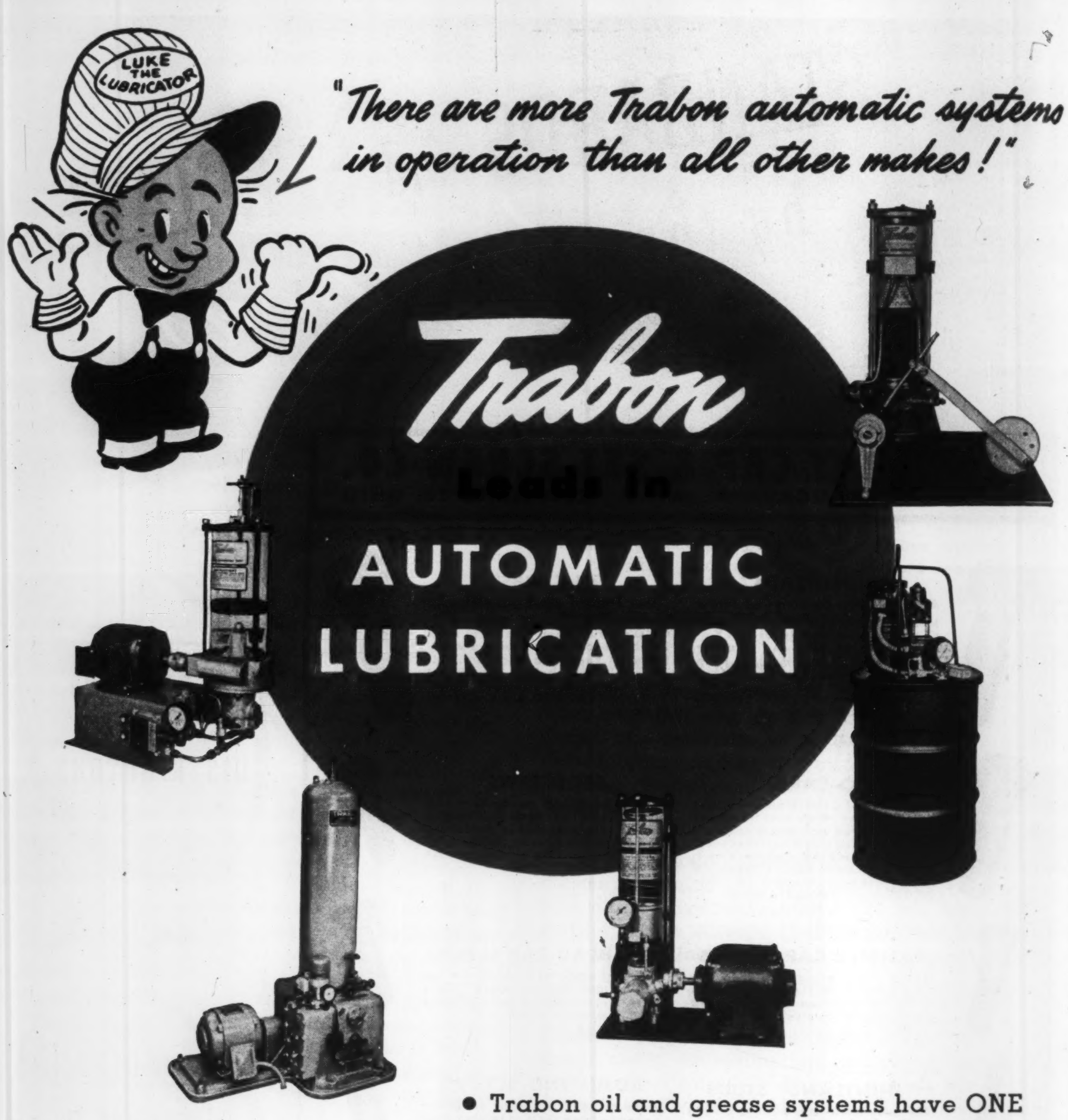
carried by
LEADING
DISTRIBUTORS

SPECIALS

furnished to
BLUE PRINT
SPECIFICATIONS

WRITE FOR INFORMATION

SEND FOR SAMPLES


LUKE THE LUBRICATOR
"There are more Trabon automatic systems in operation than all other makes!"
Trabon
Leads in
AUTOMATIC LUBRICATION

WRITE FOR YOUR COPY OF BULLETIN E 469

- Trabon oil and grease systems have ONE indicator at the pump — assuring the proper measured amount of lubricant to each point. Trabon systems are SEALED — no exposed parts . . . operate efficiently under dust, dirt, water, or grime.

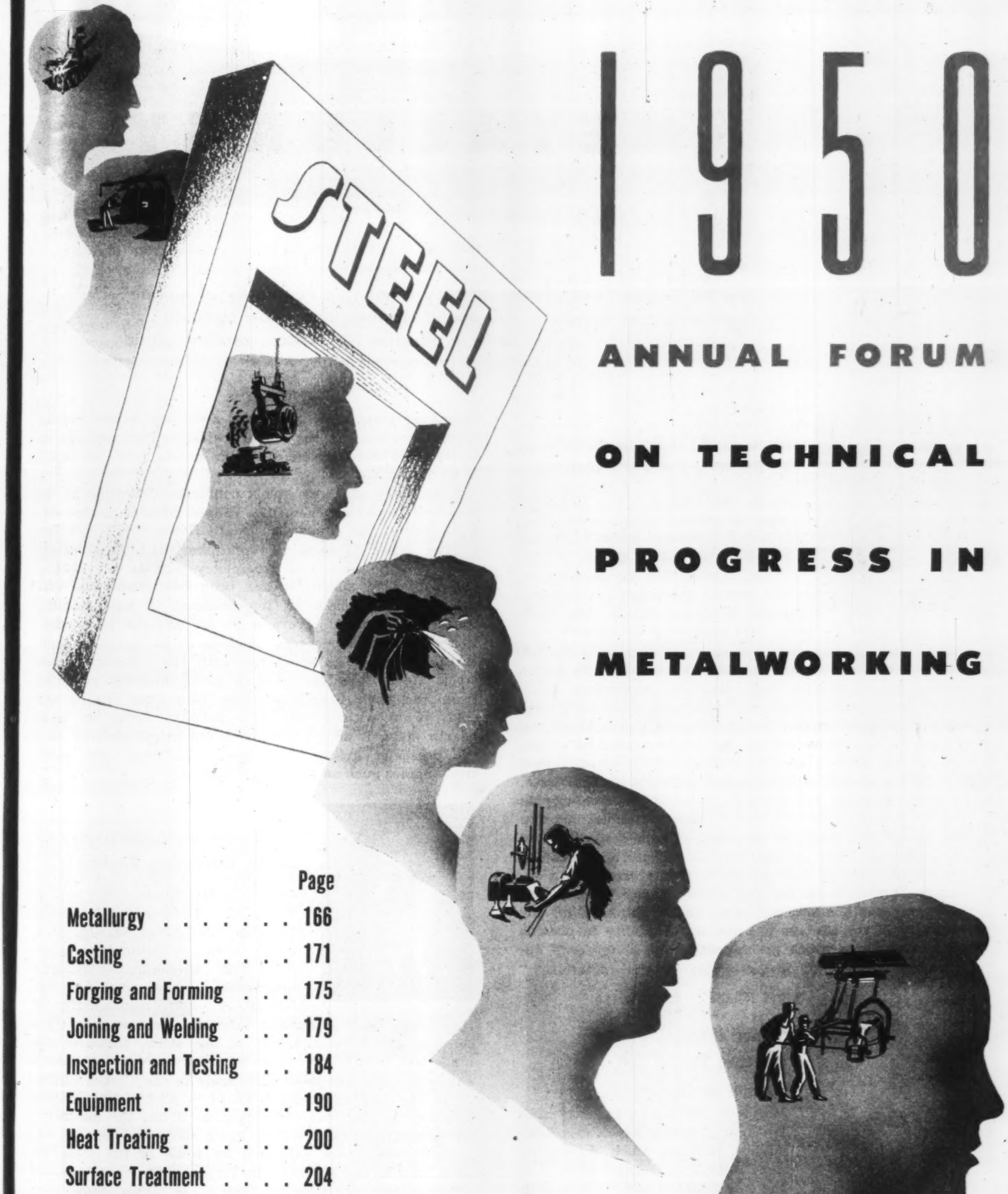
With 20 years of experience in engineering and installing lubrication equipment, Trabon can save you time and money. Regardless of size or type of machine, there is a Trabon system to fill your need. Call or write today.

Trabon
OIL AND GREASE SYSTEMS

TRABON ENGINEERING CORPORATION
1814 East 40th Street • Cleveland 3, Ohio

1950

ANNUAL FORUM ON TECHNICAL PROGRESS IN METALWORKING



Page

Metallurgy 166

Casting 171

Forging and Forming . . . 175

Joining and Welding . . . 179

Inspection and Testing . . 184

Equipment 190

Heat Treating 200

Surface Treatment 204

Lubrication 210

Materials Handling 216

Metal Production 224

Machining 240

METALLURGY

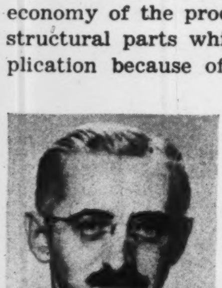
Spring industry extends use of alloy steels . . . Popularity of magnesium alloys increases . . . 400-pound titanium ingots now common . . . "Supermachining" steels boost production . . . More realism urged in appraising powder metallurgy

More Realism Recommended To Appraise Powder Metallurgy

W. R. TOEPLITZ

Vice president, engineering and research, Bound Brook Oil-less Bearing Co., Bound Brook, N. J.: "Most outstanding development in the powder metallurgy structural parts industry during the past year has been the better understanding by both the industry and its customers of some of the basic limitations of the art. It was a year in which the fantastic claims for extremely high physical properties, combined with extreme dimensional accuracy, were debunked. A much greater realization exists throughout the industry that the overselling by erroneous claims of the process has been a severe handicap and it appears that the future claims will be based on more factual data.

"Unfortunately, the trend in some of the publicity in powder metallurgy still lags behind the engineering and this, too, must be stripped of over-optimism and exaggeration. The production of structural parts by powder metallurgy has gained a strong foothold in industry and we look for the sound, steady development of innumerable additional uses, based not only on the economy of the process but also on its ability to provide structural parts which are especially fitted for each application because of production by powder metallurgy."



'Super Machining' Steels Increase Production

MAURICE N. LANDIS

Manager, Metallurgical Research Division, LaSalle Steel Co., Chicago: "Without much doubt, the most publicized development in the cold finished bar industry during 1949 has been the introduction of the new 'super machining' screw stock steels.

"These have been of two types. One type is those made by the bessemer process with improvements claimed in machinability up to 25 per cent. No exact details as to their manufacture have been released, but the impression is given that they incorporate, to some extent at least, new processes over and above merely careful control of the usual bessemer process. These steels have been produced under names such as MX-1 E steel, and X steel.

"Chemistry of these steels conforms generally to the standard bessemer chemistry ranges. However, the carbon content, as made, is usually lower than average.

"The other type is a rephosphorized, resulphurized open hearth steel with chemistry similar to B-1113, but with lead added. It has been our experience that this type will show an improvement in machinability that results, on an average, in an increase in production of about 45 per cent. Because of an apparent good surface quality, as compared with the ordinary screw stock steels, together with a good ductility resulting from the open hearth practice, this type crimps and cold forms with considerable facility. Being an open hearth steel, it shows improvements in carburizing over the bessemer grades. This grade has been sold under trade names such as Ledloy and LaLed."

Popularity of Magnesium Alloys Increasing Rapidly

CHARLES E. NELSON

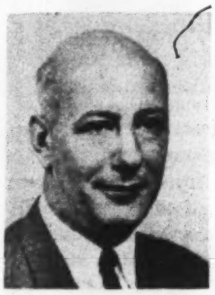
Technical director, Magnesium Division, Dow Chemical Co., Midland, Mich.: "Gradual development of zirconium containing magnesium alloys through the laboratory and semicommercial stages has been under way now and mentioned in these columns for several years. A big stride forward was made last year in that these alloys are now commercially available on a full production scale in the United States.

"In the field of wrought alloys, a 5.5Zn-0.6Zr alloy is available in the form of extrusions. It has the malleability characteristics favoring good shop and service experience which are exhibited by some of the older alloys, such as the Mg-3Al-1Zn. Its strength characteristics, however, are much higher than these alloys, being similar to the older alloys containing much higher amounts of aluminum and zinc, e.g., 8.5Al-0.5Zn. Application of this material is now proceeding at an advanced pace, particularly in the aircraft industry, by virtue of its full release from the experimental stage.

"In the casting field, zirconium is making its commercial bow in conjunction with another alloying agent.

These alloys, now available on a commercial scale, contain about 3 per cent rare earth metal as their major alloying ingredient. This agent is a specific for obtaining maximum creep properties at elevated temperatures. All alloys now offered contain this amount of rare earth. However, the zirconium content may vary between ¼ and ¾ per cent. Also, there may be up to 3 per cent zinc present. Final decision on specifications will depend on eventual agreement among various engine companies who are now procuring one or more of these alloys for production use on gas turbines.

"Another newsworthy development of the past year was the continued improvement in the process of electroplating magnesium. Continuous testing in various corrosive environments indicates that protection of a high order, much higher than originally realized, is possible. At the same time, continued experience in production shows the commercial practicality of the process."



Fabrication Improved by Metallurgical Discoveries

ARNOLD P. SEASHOLTZ

Seasholtz Metallurgical Service, Lancaster, Pa.: "Some of the metallurgical developments taken advantage of to develop new or better products are: Copper and silver furnace brazing, improved iron and steel castings, manufacturing of intricate parts by powder metallurgy, thermal treatments for better fabrication and greater production from tools, and conditions permitting the selection of the correct grade of material for its characteristic properties. A great deal of credit should be given to the progress in equipment for making and controlling proper furnace atmosphere and modern productive heat treating furnaces. These helped create or improve many of the later developments in fabrication."

Usefulness of Materials Increased by Redesigning

C. A. CRAWFORD

Development and Research Division, International Nickel Co. Inc., New York: "There are still many unsettled questions on availability and suitability of metals for aircraft engines, and much research is being done in plant as well as laboratory. Current trend is to get the best possible usefulness out of available materials by changes in design. It has been found possible to considerably increase the life of high temperature sheet metal components of gas turbine engines through design changes. The Ni-Cr and Ni-Cr-Fe alloys are now giving engine life of the order of 300 hours.

"By a similar approach, useful life of blade materials has been improved. Cast alloys high in Co and forged Ni-Co-Cr or Ni-Cr alloys are used in the production engines. These currently used alloys are subject to limitations of temperature and design is based on these limitations.

"Advanced research aimed at the utilization of higher temperatures is exploring the possibility of cooling which will permit higher combustion and turbine temperatures with the metals now used. Other research on nonmetallic compounds or sintered powdered metals has opened a prospect of higher operating temperatures with correspondingly improved efficiency.

"The impact of the demand for gas turbine engine components has stimulated the growth of the investment casting process. Precision cast blades and other parts are now standard in several engines."

Applications of Low-Carbon Drawing Quality Steel Gain

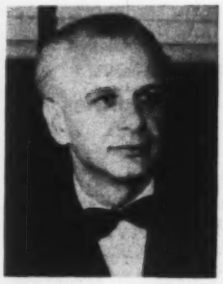
C. L. McCUEN

General manager, Research Laboratories Division, General Motors Corp., Detroit: "This year the Society of Automotive Engineers established surface finish standards for the entire automobile industry. This is important as an achievement aimed toward the standardization of the methods of determining surface roughness, thus allowing greater control of surface finishes in manufacturing operations. Every effort is being made to make the standard blocks available to the industry in the near future.

"Work has been continued during 1949 in the field of ultrasonics as applied to the detection of flaws in forgings and metal castings. Most of this work has been directed toward refinements in present ultrasonic instrumentation.

"Parts fabricated from low-carbon drawing quality steel and then carburized throughout to obtain the carbon content necessary to meet the service requirements have received much attention from the industry this year. This practice has been carried on for some time on an experimental basis. However, it was adopted by one of our prodction divisions a few years ago in the manufacture of clutch springs and is now finding an increasing number of applications.

"It has been found that one of the most serious consequences of variation in hardenability within the H-band for any alloy steel is the variation in the resulting residual stress pattern. This factor has been given little consideration in the past. Recent data, however, would indicate that a great deal of additional work is necessary to obtain a complete understanding of this phase of the hardenability situation."



400-Pound Titanium Ingots Now Common

F. R. HENSEL

Vice president in charge of engineering, P. R. Mallory & Co. Inc., Indianapolis, Ind.: In the field of new materials titanium has progressed rapidly in the past year. Four hundred pound ingots are common; a year ago 10-pound ingots were rare. New alloys promising strength weight ratios, hitherto unheard of, are a reality in the laboratory and need only overcome economic deterrent to assume commercial importance.

"A new soft magnetic material produced from powders for the frequency range between power and radio frequencies is under development. Possible applications are audio transformers, chokes, ballasts, small motor stators etc. The new material possesses lower permeability than stacked laminations but higher than powdered iron cores. A prime advantage is that it may be pressed into intricate shapes, thus eliminating punching losses and assembly costs of laminated cores.

"The magnetic ferrites are a promising group of metallic oxide core materials suitable for audio to radio frequencies. Toroidal permeabilities of 1000 have been attained with these nonconducting materials. Presently somewhat costly, their use is in such specialties as television fly-back transformer cores."

Theoretical Research Hits New High

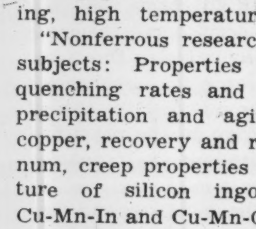
R. H. HARRINGTON

Research metallurgist, General Electric Co., Schenectady, N. Y.: "In a free society, progress in any science seems to take place in cycles of alternating emphasis on factual research and on theoretical research, varying from learning how to use the laws of nature to attempts to dictate to the Old Girl just what she will do. 1949 seems to be approaching a crest in the cycle of theoretical research.

"Ferrous research (as ever) was last year concerned with such matters as: Boron in steels, properties of cast low Cr-Mo steels, Fe-Mn and Fe-Mn-Ni Alloys, properties of Fe-Co alloys, high temperature oxidation, determining gases in metals by vacuum fusion, quench cracking, high temperature metallurgy, temper brittleness.

"Nonferrous research in 1949 dealt with the following subjects: Properties of ductile zirconium, effects of quenching rates and of quench-aging on precipitation, precipitation and aging, secondary recrystallization in copper, recovery and recrystallization in brass and aluminum, creep properties of commercial coppers, microstructure of silicon ingots, ferromagnetic alloys of the Cu-Mn-In and Cu-Mn-Ga systems.

"In time it may be recognized that 1949 witnessed the beginning of a considerable change in the evaluation of cold rolled and cold drawn brass and bronze. Both the shaping (or fabrication) and the engineering-use properties of these materials are markedly improved by simply aging correctly at prerecrystallization temperatures."



Aluminum Bronze Alloys Reveal Great Potentialities

J. F. KLEMENT

Chief metallurgist, Ampco Metal Inc., Milwaukee: "Although it seems apparent the very existence of this nation is centered around steel, nevertheless, attention should be given to the nonferrous alloys, especially the copper-base materials. Some of the metallurgy of these alloys, which have been known to man hundreds of years before iron and steel, today are many years behind when considering the remarkable development in ferrous metallurgy.

"Aluminum bronze alloys, perhaps the most potential of the nonferrous group, have just begun to reveal their hidden possibilities through recent developments. Aluminum bronze materials have been made to resist certain chemical corrosion better than stainless, nickel alloys, or other copper-base material. Still another group of these alloys is recognized for remarkable resistance to cavitation. Serious consideration has been given these materials and they are replacing present cast iron and stainless steel castings for larger hydraulic runners. Recently, alloys have been developed in aluminum bronze to replace cemented carbide for die material. These are most generally used for deep draw operations.

"In the near future new high strength cast copper-base alloys will be introduced. These will be less expensive than the beryllium copper group, with physical properties comparable to some of the alloyed steels in the 150,000 psi tensile class."

Spring Industry Extends Use of Alloy Steels

F. P. ZIMMERLI

Chief engineer, Barnes-Gibson-Raymond Division, Associated Spring Corp., Detroit: "The year 1949 brought no new materials to the spring industry, but rather extended the use of well known alloy steels. The automotive industry is a splendid example.

"In the past, 9260 has been favored for coiled suspension springs on many cars. Now that higher extras are the order of the day, the 5100 series is in use and the 8600 series is getting consideration. As the use of automatic transmissions increases so does the use of alloy steel springs. The commonest material now employed is 9254. Hot wound springs in the larger sizes used on the agriculture and earth-moving machines are being made of 8660 or 8650. Because of its high hardenability this steel is not used in small sections.

"Basic spring design has not changed much in the newer engines now being produced, but has been refined to some extent. Use of higher stresses in some large volume items, as valve springs, has shown material economy. There is a definite tendency to replace high priced materials, for example music wire, with lower cost products recently developed to fit where the highest is not needed and lower priced material is not good enough.

"Articles in the public press regarding a 'negator spring' attracted some attention. This was a form of flat spring steel coiled much the shape of a clock spring but in which the steel had been cold worked to retain residual stress. This stress was induced in such a way and in such an amount that springs could be produced with a flat or even negative rate when desired."

Rationalization of Hardenability Foreseen

B. F. SHEPHERD

Chief metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J.: "A regrettable trend is noticeable today for oversimplification by the use of hardenability data and mathematical calculations based on general assumptions. Mathematics is an exact science but metallurgy is still in the art science stage. Many of these general assumptions are incorporated in our technical papers and books in increasing quantity but the statements are generalizations and not precise facts. Steel unfortunately cannot read the books and learn how it should behave. It must react according to actual conditions.

"This mathematical metallurgy trend is an advertising man's dream. The spread of information in this manner leads to a belief in its infallibility. Our scientific-minded brethren understand the need for generalization in their studies. They, however, recognize the distinctions which must be drawn in interpretation. We less-learned metallurgists on the firing line are not apt to recognize these distinctions and certain erroneous ideas become fixed in our thinking. The mathematical expressions of hardenability can only be generalizations. I look forward to a swing of the pendulum in the opposite direction and a rationalization of hardenability."

Titanium Developments Spur Heat Treating Furnace Demand

WILLARD ROTH

Engineer, Industrial Heating Division, Westinghouse Electric Corp., Meadville, Pa.: "Recent rapid developments in the metallurgy of such metals as zirconium and titanium are reflected in a demand for production furnaces adapted to the heat treatments of these metals. Such furnaces are unique in that they may operate with atmospheres of helium or argon at pressures from a few microns of mercury pressure up to two or more atmospheres. These requirements present unusual, but not insoluble, problems to the furnace designer. The use of expensive rare gases for atmospheres and the pressure range required, necessitates unusual care in design to minimize atmosphere gas consumption and to maintain atmospheric purity.

"Another sign of our times is the requirement, in the production of synthetic fuels, for heating units operating at high temperatures and at pressures of several thousand pounds per square inch.

"There also is an increasing demand for sintering furnaces with temperature range of 3000° F or above. Such furnaces use molybdenum or tungsten resistors, usually operating with hydrogen reducing atmospheres."

Weldability of High Heat Alloys Improved

PAUL GOETCHEUS

Manager, Rolled Products Division, Michigan Steel Casting Co., Detroit: "Practically all the chrome-nickel-iron heat resisting alloy grades which are now commercially available were developed prior to 15 years ago and have not been changed since their original development. These alloys include the stainlesses such as 309, 310, 430, etc., as well as the Inconel analysis. When these alloys were developed the 35 per cent nickel-15 per cent chrome analysis or AISI type 330 was the work horse of the industry and still continues to be. This alloy, however, has gone through some finer chemical changes in the last couple of years which has made its usefulness tremendously greater.

"Extensive tests have been carried out in carburizing atmospheres at 1700° and where the type 310 and Inconel analyses have lasted from 4000 to 7000 hours; the improved type 330 analysis has exceeded 9400 hours regularly. Changes are chiefly concerned with the ratios of silicon to carbon in both the base metal and the weld metal analysis. If the silicon content in the base metal has 0.75 per cent minimum it is found to resist the corrosion of carburizing atmospheres very well and if it is held to a base maximum of 1.25 it is weldable.

"Weldability is dependent on the ratio of silicon to carbon holding this to approximately 2 to 1; therefore, if the silicon content should be 1 per cent for maximum corrosion resistance carbon content of the deposited weld metal should be approximately half this or 0.50. With this combination the ductility of the weld metal as well as its corrosion resistance is excellent and assists this good alloy to be the most economical for most metallurgical furnace applications such as carburizing, nitriding, annealing, cyaniding, carbo-nitriding."

Metallurgical Research On the Increase

ROBERT A. LUBKER

Assistant chairman, Metals Research, Armour Foundation of Illinois Institute of Technology, Chicago: "Evidence of a greatly increased interest in metallurgical research is shown by the growing emphasis of industrial companies on specific problems. Our volume of metallurgical research has increased from $442,000 in 1948 to $600,000 in 1949.

"In general, these programs are motivated by desires for: Cost reduction which is illustrated by a program directed toward less expensive oils for hot dip tinning. The return to a competitive market has also stimulated several programs directed toward less expensive metallurgical processing or use of less expensive materials. Several projects fall in the category of product improvement for better competitive position. For example, work is under way directed toward an improved chromium plate on piston rings. Several companies are looking for new products to market in the future. Research of this nature is best illustrated by an extensive program directed toward economical production of titanium metal. Considerable information is being uncovered on the corrosion mechanism involved in the failure of tin cans. Also, the fundamental mechanism of metal transfer in the welding arc is being studied. (Although these programs generally require more time for results, the gains are frequently more spectacular in the long run.)

"A research program on the beneficial role of molybdenum in the problem of temper brittleness of alloy steels illustrates research aimed at new markets. Increased use of molybdenum steel should result."

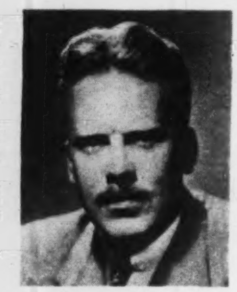
Lower Die Costs Derived from Carburizing Steels

GEORGE V. LUERSSEN

Chief metallurgist, Carpenter Steel Co., Reading, Pa.: "The past few years have been marked by a considerable increase in the use of carburizing steels in the manufacture of plastic molding dies. These steels are designed so that they can be annealed quite soft for hubbing the impression, and so that they can be readily carburized subsequently to obtain both a high surface hardness and good core strength in the finished die. They also must have a high degree of cleanliness.

"One of the types referred to contains about 0.10 per cent carbon and 2.25 per cent chromium. This is capable of sufficiently soft annealing for excellent hubbing properties, yet it has the advantage of uniformity in carburizing, and high core strength, properties not present in the so-called hubbing irons.

"A more highly alloyed type containing 0.10 per cent carbon, 5.0 per cent chromium, 0.90 per cent molybdenum and 0.25 per cent vanadium is also capable of hubbing, although not quite as easily as the 2 per cent chromium type. However it has the advantage of being hardenable in air and of attaining a very high core strength and, in addition to this, good red hard properties to withstand elevated temperatures in service."



Does Micellar Theory Portend 10 Million Psi Steel?

CARL A. ZAPFFE

Metallurgist, Baltimore: "At the Western Metals Congress in Los Angeles in April, 1949, a 'new theory for the solid state' was proposed which has some intriguing aspects. Just as nuclear fission proved that nothing like the full energy of atoms displays itself in ordinary chemical reactions, so does it appear that materials of construction fall far short of utilizing the full cohesive power actually existing between atoms. Physicists and metallurgists alike have recognized for many years the puzzling fact that solids such as metals show actual tensile strengths which fall far short of calculated values—by about a hundred.

"According to this new 'micellar theory', which attempts to explain the puzzle of the solid state, liquid metal is a mobile mass of submicroscopic 'micelles' or clusters of atoms. These gel together during solidification to form the solid, which forever thereafter partakes somewhat of the subdivided nature of a 'cluster of clusters'. Plastic working of the solid then involves movements of layers of these micelles on one another; and fracture, also melting, involves the breaking apart of the micelles—not individual atoms—from one another.

"Since the micelles hang together with secondary adsorption-type or surface tension forces, rather than primary atomic forces, the solid fractures at stresses far below those needed to tear the atoms themselves apart. Steel has had no chance to show what it could do.

"While the 'micellar theory' will require much further study before it can be either proved or disproved, it is already safe to say that tiny local stretches of atoms do exist within steel, for example, representing metal whose tensile strength runs in the millions of psi. The big problem for the future is to take that precious stuff out of the micron or micellar range and build it into something large enough to hammer—but what with?"

Ship Plate Steels Subject To Many Mill Variables

W. P. GERHART

Metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa.: "Carbon steel ship plate specifications embody tensile and bend tests. These tests have long been satisfactory for riveted structures which prevailed for many years. With advent of welded shipbuilding, serious fractures in hull plating developed.

"Mechanism of failure indicated notch brittleness was responsible and numerous investigations soon got underway. Standard notch bar specimens were first employed, from which many other tests were devised, all employing a notch specimen varying greatly in size and outline. 'Transition temperature' was generally used as an index in classifying the various steels investigated.

"The great mass of data collected places the steels in the same general category with respect to their notch sensitivity, regardless of the test employed.

"Investigations covering design indicated that avoidance of sharp corners, such as hatch corners, was more than ever important for welded structures in reducing the tendency for sudden failure. Workmanship was also involved, failures starting from defective welds, poor burning, fitting, etc.

"From the foregoing it can be generally agreed that design, workmanship and steel quality are all factors affecting the sudden failures in welded construction.

"Ship steel quality can be improved by using a lower carbon and increasing the manganese to meet the mechanical properties specified. Killed steel shows a further improvement in notch resistance. The latest American Bureau of Shipping specifications for ship plates include these features for plates over ½-inch in thickness. However, variations in mill practices have a marked influence on the notch sensitivity of hot rolled plates, particularly as the thickness of the finished plate is increased, most sudden failures occurring in material over ½-inch thick."

Vacuum Cathodic Etching Aids Metallographers

DON M. McCUTCHEON

Applied Physics Research, Ford Motor Co., Dearborn, Mich.: "Metallographic examinations of metal structures occupy a prominent place in metallurgical investigations and routine operations in many manufacturing processes.

"Etching of polished metal samples to bring out microstructure has been almost entirely dependent upon the selective chemical attack of acids and other corrosive liquids. Little comment has appeared in print which would indicate that these chemical etching reagents were not entirely satisfactory. Recently, a novel method of etching by bombarding a metal sample with gas ions in a partial vacuum was proposed.

"Two obvious reasons exist for seeking improvements in etching techniques. One is the increasing use of improved or new microscopic equipment such as the ultraviolet light or phase contrast microscopes, and finally the electron microscope. The second reason is the rapid expansion of metallurgical investigations into new metals and alloys, particularly the newer high temperature alloys which are difficult to etch chemically.

"Use of the electron microscope in steel microstructure investigations is expanding rapidly. A committee set up by the Electron Microscope Society to study the electron microstructure of steel has recently affiliated with the ASTM committee E-4 on metallography as subcommittee XI. It is reported that several members of this committee are actively investigating the possibility of using vacuum cathodic etching for preparing steel specimens for examination in the electron microscope. This new method of etching metal samples at least allows the metallographer an opportunity to study the possible existence of artifacts in chemical etching techniques."

Foundries hit hard—test still to come . . . Die casting industry to grow this year . . . Popularity of ductile irons to expand . . . Oxygen aids furnace operations . . . Severe-service castings in greater demand

Oxygen Gives Foundry Furnace Operators More Flexibility

G. E. BELLEW

Steel mill specialist, Air Reduction Sales Co., New York: "A noteworthy development in 1949, which looks promising for even further growth in the future, was the application of gaseous oxygen for decarburization in foundry furnaces. Particularly in the small acid-type furnaces, but also in the larger basic foundry furnaces, this application has produced marked savings and improvements in results.

"Appreciable time savings are realized in both high and medium carbon heats, and by using oxygen, foundry furnace operators have greater flexibility in timing their heats to meet the requirements of the casting floor. Savings in other cost factors more than equal the cost of the gas consumed. In alloy heats, valuable alloy constituents are recovered.

"After over 2 years of extensive work, it has definitely been established that oxygen has even more universal application in foundry melting units than it has in ingot shops. This is true whether carbon or alloy castings are made, and whether acid or basic, electric or open hearth, melting units are employed."

Seal of Approval Protects Buyers of Zinc Die Castings

R. DAVISON

Manager, market development division, New Jersey Zinc Co., New York: "An important development in the die casting industry during the past year has been the introduction of the 'certified zinc die casting plan' by the American Die Casting Institute.

"Definite composition limits for zinc die castings have long been established by the American Society for Testing Materials, and it is the purpose of the new plan to insure that every casting will conform to these limits. This is accomplished by frequent sampling of castings from all participating producers for analysis by an approved laboratory. Each producer can use an official certification seal on his castings and in his advertising only when the sampling and analysis indicate that he is continually conforming to the alloy standards set down by ASTM. Thus the certification seal assures the die casting purchaser of obtaining castings having the outstanding properties which have earned such a high regard for zinc die castings in engineering circles.

"The wide diversification of applications for zinc die castings witnessed in 1949 indicates that product engineers in many fields outside of the major mass-production industries are turning to this high-speed production method and material. With the return of keen competition for the consumer's dollar, the ability of zinc die castings to lower production costs without sacrifice of quality is commanding major attention."

Cast-Weld Construction Offers Many Economies

JOHN HOWE HALL

Metallurgist, Swarthmore, Pa.: "Use of what has come to be known as cast-weld construction is being generally accepted as the best solution of the old controversy over the relative merits of weldments and of steel castings. In an increasing number of cases, instead of using integral steel castings, or structures built up of a number of pieces of rolled steel, manufacturers are producing parts composed of several separate steel castings, or a combination of steel castings and rolled steel, united by welding.

"Both the steel foundries and the welding shops are coming to see the desirability and economy of using steel castings for the complicated portions of assembled structures, that would be costly to make entirely by welding small pieces together, and rolled or forged steel for the parts that are not readily made of cast steel. It is not too much to say that in the near future, many concerns that have considered themselves to be foundries pure and simple, will be using cast-welded practice to a greater extent than was thought possible 5 years ago.

"Reclamation of used molding sand, much of which has heretofore been sent to the dump and wasted is being intensively studied by the steel casting industry as a whole. In addition, several steel foundries are installing equipment designed to clean thoroughly their used sand so that it can be substituted for new material. Apparently this can be done at a cost that results in a saving over the old practice of using all new sand for the "facing" of molds. The greater the distance the sand has to be shipped to reach the foundry, of course, the greater the possible saving, since freight charges make up a large part of the cost of new sand in a great many foundries."

Caution Urged in Using Nodular Cast Iron

H. A. SCHWARTZ

Manager of research, National Malleable & Steel Castings Co., Cleveland: "The subject which seems to have attracted most general interest in ferrous metallurgy during 1949 has been the announcement by various workers of the making of a cast iron in which, without heat treatment, the graphite is present in a dense and spherulitic form. Following the original British announcement, two important American interests have published in this field.

"It is doubtful whether more recent publications have added much original information not contained in the earlier publications. The startling character of this discovery has attracted wide-spread attention and apparently the general public has not read the published information too accurately.

"While there may be certain fields for which this material is ideally suited, it is suggested that prospective users consider very carefully the engineering properties which can be guaranteed and the cost of obtaining these properties, in deciding upon the economic merits of the material."

Higher Quality Castings To Result from Past Research

CHARLES W. BRIGGS

Technical and research director, Steel Founders' Society of America, Cleveland: "The year 1949 has been a period of significant technical advances in the steel castings industry. Great strides were made to insure production of high quality castings.

"Progress is being made and further plans are being formulated to disseminate new information regarding better methods of designing steel castings and ways of introducing economies of cast-weld constructions for the benefit of design engineers and students. Continued emphasis is being placed on advantages to be gained from new developments and equipment that will enable industry to produce higher quality, lower cost castings.

"The industry has continued its efforts to collect and investigate the available data on methods of reducing cleaning costs on its cast products. The information will be used to great advantage, not only in decreasing cleaning costs, but in improving surface finishes. In addition, steel foundries are renewing their interests in the maintenance of closer tolerances on cast surfaces in hopes of securing a decrease in machining costs.

"Studies on the mechanics of flow of molten steel in sand molds by varying the gating systems yielded additional fundamental information that will further enhance production and quality control. Additional completed studies demonstrate completely that the as-cast microstructure does not materially effect properties of a heat treated steel casting. This revealing study has aided immeasurably in disproving the old rule that as-cast grain size and structure is an inherent property of cast steels.

"Work is now in progress to enable foundrymen to determine distances that risers effectively feed various types of castings and this information, coupled with previous investigations on riser efficiencies, will bring about higher yield ratios of castings shipped to castings produced."

Gray Iron Still Very Useful Enginering Material

E. B. SHERWIN

President, Chicago Hardware Foundry Co., North Chicago, Ill.: "Progress made during the past year in manufacturing ductile iron is probably of most interest to gray iron foundrymen. It has been developed now to a point where a number of foundries can produce this material satisfactorily as controls have been established to a degree where a uniform product can be expected. Although this iron can be made of a high tensile strength and give considerable ductility, it must be remembered by engineers who contemplate the use of this material that they will be getting away from the one feature quality for which gray iron has been so well-known, namely, the ability to absorb vibration.

"Undoubtedly it will take some time before complete experimentation with this radically new material has been completed and adopted for general use. Aside from the above development, considerable progress has been made by many foundries not only with better methods of control in the melting of gray iron but also by mechanization of their operations in order to meet competition without as well as within the industry. In addition, closer dimensional tolerances can be maintained with the result that cast iron will still maintain its utility as an engineering material from the standpoint of view of cost, uniform physical properties and dimensions."

Severe-Service Castings In Greater Demand

JOHN W. JUPPENLATZ

Chief metallurgist, Lebanon Steel Foundry, Lebanon, Pa.: "Trend toward higher alloy contents for pressure castings has been definitely established. Low alloy steel castings for temperature requirements to 1150° F. are increasing in use, with up to 9 per cent chromium and 1 per cent molybdenum content for maximum structural stability, creep and scale resistance. Weldability of these ferritic type alloys is now a more important consideration modifying many of the existing standard dimensions.

"Higher alloy castings of the austenitic type for steam, oil, gas-turbine and jet engine applications are being required in greater quantities. These alloys are fulfulling a service at elevated temperatures, usually above 1150° F, accompanied with pressures of relatively high order.

Some of the newer alloys under development within the last few years are now in service. As temperatures and pressures increase, larger and heavier quality castings are being employed.

"Soundness and design of castings for these more severe service requirements demand closer co-operation between the engineer and foundryman, observing the principles of directional solidification and avoiding impractical designs not compatible with fundamentally sound steel foundry practice."

Sees Growth for Die Casting Industry During 1950

R. W. DIVELY

Metallurgist, The Hoover Co., North Canton, O.: "The die casting industry has taken further advances during 1949, even with the decrease in production that hit the first part of the year. This decrease of volume has not hindered the progress of development from a standpoint of producing better castings. There have been new applications designed for production by the die casting method. Also, there have been applications redesigned for die casting where the parts have been made previously by some other process. This has been done for economical reasons as well as the parts being more suitable for die casting.

"New developments have been made to control equipment by instrumentation. These instruments help to take the guess work out of machines producing the castings. This eliminates some of the human element so that the process becomes more scientific. Some of these achievements have been the setting and controlling of the shooting speeds for injection of the metal. A more accurate check of die temperatures, metal temperatures and stresses applied to the die and hydraulic system that effect the equipment's operation. Development of automatic ladling is another improvement that is being used more extensively. All of these tend toward consistent production of better die castings which will help the industry grow. This work has been conducted by individual companies through the co-operation of scientific groups interested in die casting. Unification of this work has strengthened the industry for the betterment of its product.

"With the increase of production volume the last half of the year, it is hoped that the industry will get back into a normal rate of production instead of producing for inflated inventories. As in the past, there are all indications that the industry will grow larger during 1950."

Foundry Mechanization Continues Expansion

LEON F. MILLER

Machine Division, Osborn Mfg. Co., Cleveland: "Following World War II, a considerably greater effort on the part of the manufacturers of foundry molding machines has been directed toward improved mechanization than perhaps at any like period in the past 20 years. Principal reason for this activity has been the scarcity of suitable foundry labor and the desire to decrease cost wherever possible rather than increase price.

"Many molding operations are still done manually. These remaining operations are gradually being mechanized to the point where there will be practically no weight-lifting operations left in the making of a mold. In addition, more and more of the operations are being made automatic as they are mechanized.

"It is believed that the change which is taking place will continue since it is apparent that the labor condition existing prior to the war is a thing of the past. It is to be expected that developments in molding methods during the next few years will obsolete machinery now in operation and vitally affect the trend of design in related equipment, such as sand handling and treating and mold conveying equipment."

Increased Interest Seen in Shrinkage and Gas Inclusions

HAROLD J. ROAST

Consulting chemist & metallurgist, Quebec, Canada: "An encouraging development in the nonferrous metal casting or foundry field in 1949 has been the increased interest shown in the scientific work regarding the two items of shrinkage and gas inclusions. When these items are really understood and remedies applied a solid foundation will have been obtained for all subsequent stages of casting production.

"In 1950 one would expect to see the installation of many more high frequency melting units of either the 'lift coil' type or stationary units, evidence having been recently supplied showing that their high first cost is justified by improved working conditions and enhanced metal quality. The recent introduction of the problem of microbic instigated corrosion of metal in sea water and other waters seems likely to put still further demands on the metallurgist to combat this angle of metal deterioration."

Popularity of Ductile Irons Will Expand Rapidly

RAYMOND L. COLLIER

Executive vice president, Gray Iron Founders' Society Inc., Cleveland: "Progress was again achieved by the gray iron foundry industry during the past year. With the advent of 1949 the iron and steel scrap position altered materially, this commodity being in plentiful supply, available at prices about half as high as during the preceding year. Pig iron was under government allocation for housing end uses during the first few months of 1949, but following a conclusive presentation of the facts by Gray Iron Founders' Society, such allocation was dropped toward the end of April, many months before the law, according the allocation power to government, was due to expire.

"Modernization and mechanization of gray iron foundries proceeded throughout the year so that today the industry is better equipped and offers better working conditions than ever before.

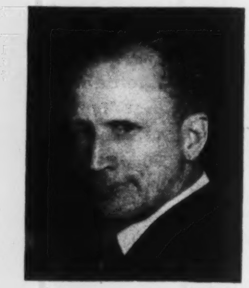
"Last year also saw steady progress in the production of ductile (so-called nodular) irons and two patents covering this process, said to be basic, were granted to a company which pioneered the use of magnesium in this country to achieve nodulation of iron. While the total volume of commercial castings possessing the strikingly higher mechanical properties of this new product was relatively small, it was, nevertheless, significant. It appears that the popularity and marketing of ductile irons will expand rapidly in the years just ahead.

"Terms and conditions of sale of the industry were slightly modified at the suggestion of the National Association of Purchasing Agents, the revised code now being available through the society.

"Gray iron foundries now have monthly statistics to guide them, thanks to the society, including information on number of employees, average hourly earnings, productivity, operations and number of lost-time injuries.

"The smog question has become increasingly important to the industry. Accordingly the society is conducting a nation-wide survey in order to gather all available information on this subject which will be passed on to the membership.

"It is believed that gray iron shipments (tons) for the year just ended will again show that close to 78 per cent of all cast products, both ferrous and nonferrous, were gray iron, thus perpetuating the industry as the second largest in the metal-working field—next to rolled steel. In my opinion the value of gray iron products in the year ahead will constitute a tonnage of about 10 million tons, if no unforeseen difficulties intervene."



Foundries Hit Hard But Test Still to Come

OLIVER SMALLEY

President, Meehanite Metal Corp., New Rochelle, N. Y.: "Last year presented to the foundry industry as a whole a problem of economic adjustment that has far outweighed all others. The sudden and severe Spring depression found many foundries unprepared as the large number of bankruptcies testifies —most of the others have been more than occupied in re-organizing their operations and sales to turn an otherwise profitless year into a profitable one. Strikes did not help the situation, and while the outlook for the first half of 1950 is promising, the real test is still to come.

"Labor is in a disturbed mood and, while most of the workers themselves realize they cannot get further advances, top labor organization is prodding them to the point of creating constant discontent.

"Most costing systems are proving obsolete owing to vast changes in labor and material ratios that have taken place over the years. Foundries are coming to the realization that only by refiguring each single individual pattern can they know where waste or efficiency is involved.

"Pattern making costs have reached absurd heights and, while some progress has been made, high costs and time loss through pattern construction has caused many casting buyers to change to other materials.

"Obsolescence has been very rapid during the war period. Some foundries have spent too much money for equipment and others are trying to operate machines which should have long been scrapped—a keen appreciation of this fact is now manifesting itself.

"In the field of nodular cast iron, many foundries whose hopes have been pinned to an immediate and profitable business have been disappointed. This over-publicized material with the so-called properties of steel which could be made at the cost of gray cast iron has proved disappointing to some. It is now realized that its manufacture calls for all the metallurgical know-how, precision of control and trained experience that other high-property ferrous materials demand."

Greatest Advance Seen in Foundry Annealing Practice

JAMES H. LANSING

Technical and research director, Malleable Founder's Society, Cleveland: "Past year was one in which malleable foundries rounded out and balanced their production equipment. In some plants this meant supplementary installation of conveyor equipment for sand, molds, molten metal or material handling. In others it meant expanded use of powered lift trucks, small powered shovels, furnace charging equipment and track and trolley systems for handling hot metal. Probably the greatest improvement took place in annealing departments where many new installations of packing, dumping and material handling equipment were made. These both increased productive efficiency and improved working conditions.

"To aid in the educational work, our society recently released a 30-minute technicolor film entitled 'This Moving World,' the story of malleable iron. Enough of the manufacture, metallurgy, engineering properties and applications of malleable are shown to be instructive and interesting to a wide audience. It graphically shows behavior of the metal in the mold and changes which take place in the annealing process. Machinability and other engineering properties are demonstrated.

"Producers of pearlitic malleable have expanded this material's field in such applications as universal joint yokes, gears, sprockets and diverse applications where increased strength and hardness are essential, and somewhat lower elongation, no disadvantage.

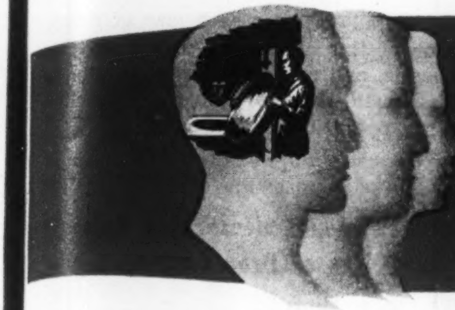
"In connection with the surface hardening characteristics of pearlitic malleables, a research project is being sponsored at the University of Michigan by the Malleable Division of the American Foundrymen's Society. The relative time and temperature requirements of various types of pearlitic structures are being determined, when either flame or induction hardened.

"Research work is also being carried on by our society at the Southern Research Institute, dealing with various considerations in possible expansion of the industry's field, through the use of nodular graphite techniques, if found practicable."

Studies Casting of Hollow Sections

C. G. RAIBLE

President, Fanner Mfg. Co., Cleveland: "General aim in our particular field, which covers foundry chaplets and finished malleable iron products, is directed toward improvement of product, to assist customers in making savings in their own plants. This is particularly true of the Foundry Chaplet Division, which has under development, simpler and cheaper means of casting hollow sections and means of eliminating the necessity of ever welding chaplet spots on castings. This is being conducted in conjunction with Battelle Institute. We feel that definite improvement of methods will result for the foundry industry and very considerable savings."



FORGING and FORMING

Pension squeeze may raise prices of drop forgings. . . . New markets seen for hydraulic presses . . . Advanced die design improves stamping and forming . . . Impression die forging gains on three fronts

Shop and Market Served Determine Press Requirements

DAVID C. VERSON

President, Verson Allsteel Press Co., Chicago: "The trends we have noted regarding the press requirements of the stamping industry more or less resolve themselves into three general classifications which seem to be determined by the type of shop and the market it serves.

"The trend of the large high production stamping shops continues in the direction of completely automatic press equipment. In shops of this nature, the cost of the special engineering which enters into the design and manufacture of this type equipment and the unusual tooling required for its successful operation, is justified by the great reduction in costs realized on long continuous runs.

"In the case of the intermediate range of shops, we have noted a trend in a limited sense, toward the purchase of specially engineered equipment which features refinements applicable to a particular job. However, this is always done with the thought in mind that the press be adaptable to quick change-over to run-of-the-shop operations.

"The smaller shop trend continues toward press equipment which offers versatility as its chief feature. Here the need is greatest for machines which can readily be switched from one small run job to another in the shortest possible time."

Underdrive Presses Afford Maintenance Accessibility

E. A. IRWIN

E. W. Bliss Co., Toledo: "Present trends in design of metal forming presses are influenced by the users' demands to a larger degree than heretofore. For instance, through the Joint Industry Conference, automotive and other industries working in cooperation with press builders established rather comprehensive standards of press construction and dimensions. Major objective of this program was to provide the mass production industries, who have multiple plants and numerous subcontractors, the opportunity to achieve quick and economical interchangeability of dies throughout their manufacturing organizations.

"Underdrive presses have been specified by large press plants, especially in large size equipment. Advantages in low head room, accessibility (in the pit) to the drive unit for maintenance are major considerations. As mentioned above, the large press users specify the speeds and capacities of press equipment needed for specific operations.

"Use of coil stock and automatic press equipment continues to increase. More inquiries are received for coil cradles, straighteners, feeds and scrap cutters and there is more interest in progressive die work. Real high production presses have come into their own. These are specially designed machines with a rigid four-piece steel tie rod frame but having a light compact slide. Strokes are short beginning at ¼-inch and of course speeds are high—over 1000 strokes per minute in some cases."

Increased Interest Noted in Large Hydraulic Presses

HOWARD M. HUBBARD

President, Hydraulic Press Mfg. Co., Mount Gilead, O.: "In recent months, activity in the hydraulic press industry has seen an increased interest in large presses ranging from 2000 to 18,000 tons. Many of these large machines are for specialized metalworking applications, such as the forming of large diameter high pressure pipe, large aircraft stampings, cold extrusion of steel, deep drawn steel tanks. This company has developed a press and die combination which will produce in a single press stroke shells having a reduction in blank diameter of 62 per cent. This means that a single press will now do the work previously done by two.

"Lower production costs are the keynote in today's competitive metal-working market. Stampings are well known as a practical approach to this problem. H-P-M research is geared to development of presses which will produce more stampings per day without sacrificing quality. These developments are now in the final testing stage.

"Although the die casting industry has not been operating at top capacity in recent months, several outstanding applications indicate a broader use of pressure castings. Recently, on an experimental basis, complete automobile door frames were die cast in aluminum. The die casting of electric motor rotors is another example of an industry which has switched to pressure castings for lower costs.

"In our own shops, special emphasis on reduction of manufacturing costs is of prime importance. New machinery has recently been installed which will permit higher cutting speeds. Welding is being used for fabricating of press assemblies, permitting rigid structures with minimum weight. In line with this modernization and tooling for larger press production, H-P-M recently installed several unusually large machine tools including an 8-inch horizontal, planer type, boring, milling and drilling machine."

Advanced Die Design Improves Stamping and Forming

JOHN F. HERKENHOFF

President, Minster Machine Co., Minster, O.: "During the past year, I have frequently heard the expression: 'You press builders sure are lucky,'—because business volume in the press industry has maintained a comparatively high level of activity. Just a casual glance at this phenomenon would possibly indicate that some fairy princess has waved her wand over the press business.

"We in the press industry, however, have a different and more logical answer. The pressed metal industry, during recent years, has been going through an evolutionary process. Advanced die design and better basic materials, backed up by press equipment of extreme accuracy, has opened up vistas of stamped and formed metal parts never before thought possible. This has greatly expanded the use of press equipment.

"Movements of this kind always lead to more and more research and development programs—that is the healthy American way. The stamping industry can continue this march of progress. No doubt, many improved techniques and production procedures still remain to be developed to create an ever-expanding market for stamped metal parts and products at ever-decreasing costs.

"The Pressed Metal Institute which was organized a number of years ago by the job stampers has been acting as an adviser and clearing house for technical information in their industry. The whole stamping industry has a need for the services of such a technical society, and we believe that every member in the stamping industry should subscribe to such a service, dedicated to the continued improvement of the industry."

New Equipment Speeds Hole Piercing

THEO. A. WIEDEMANN

Vice president, Wiedemann Machine Co., Philadelphia: "A new development combines the versatility, accuracy and high speed of the pantograph for rapid hole location, with the time saving principles of this turret punch press, which provides quick punch and die selection. By using a template with ¼-inch diameter holes accurately located corresponding with the center of each round or shaped hole or opening in the work, a stylus point on the pantograph engages in each hole and the work is thereby positioned under the proper punch in the turret. The operator follows from hole to hole in the template, the holes being connected by colored lines for each size of punch. With the introduction of this machine it is now possible to pierce panels, chassis, and similar material in lots up to 2000 of a kind at costs which are favorable in comparison with long run operations."

Pension Squeeze May Raise Prices of Drop Forgings

C. H. SMITH JR.

President, Steel Improvement & Forge Co., Cleveland: "First three quarters of 1949 saw much progress throughout the industry—one that brought to a halt the inflationary trend characteristic of the postwar year. The drop forging industry did its part in this effort by improving methods, installing new equipment, and increasing efficiency wherever feasible, thereby making possible lower prices.

"With announcement of the Bethlehem noncontributory pension plan in the fourth quarter of 1949, a real impetus again was given to inflation. It does not seem likely that any decrease in price can be anticipated by the forging manufacturer for his important raw materials such as steel and coal, and it is quite likely that some of these basic costs will rise during 1950.

"Should a successful effort be made to force the drop forging industry to accept as a cost of operating higher labor costs in the form of pensions, etc., it can only result in the passing along of these additional costs to the consumers during the coming year.

"One of the most promising technical developments on the horizon is the use of titanium and titanum alloys as forging materials. This metal which combines high strength and low weight can very easily become one of the principal structural materials in the aircraft industry during the next decade. Work done thus far indicates that while titanium must be carefully handled, it can be readily forged into rather complex shapes."

Impression Die Forging Advances on Three Fronts

W. NAUJOKS

Special projects engineer, Ladish Co., Cudahy, Wis.: "Major trend in the field of impression die forging (closed die forgings) seems to be three-pronged: 1. Heavier equipment is being used for making larger impression die forgings. 2. New techniques are being developed for improvement in quality. 3. Inspection methods that formerly were very special are now routine.

"Heavier, larger equipment has permitted production of larger impression die forgings, and their use has been extended to nearly all branches of the metal fabrication industry. One large forging can now replace several small forgings on parts that were considered a subassembly. The single forging reduces assembly time by eliminating riveting or welding operations, and scrap losses are reduced. Also it is possible in many cases to modify design in the large forgings so that often considerable weight is saved. Not too many years ago, a closed die forging of 500 pounds was considered about the top limit. Today impression die forgings weighing 3500 to 4000 pounds are being produced. It is not unlikely that impression die forgings weighing 6000, 8000 pounds or even more, will be possible.

"Many new techniques have been developed and tested which tend to offer improvements in quality and broaden the scope of use in impression die forgings. Attention to the position of wrought flow lines has developed increased strength, or permitted reductions in weights without losing any of the strength, especially where impact, shock or fatigue conditions are encountered. This is particularly important on parts that are used on mobile equipment.

"Quality requirements have been rising steadily and much of the quality inspection that was formerly considered as being special is now routine. Many new types of inspection equipment, some of them making use of ultrasonic vibrator procedure, have been developed for the assurance of sound forgings. It is expected that the coming year will find that impression die forgings will extend to many new applications over new horizons."

New Processes and Equipment Seen as Near Future Trend

BRYANT BANNISTER

Consulting engineer, National Tube Co., Pittsburgh: "In the manufacture or fabrication of various kinds of products, competition has grown more and more keen, especially during the last few years. Refinements in methods have been confined largely to details. This is a natural evolution and no doubt will continue, but it is the writer's belief that major changes in processing will be evolved in increasing proportion.

"As present equipment and processes become developed to the practical limit or have become obsolete, new processes requiring new equipment will be more representative of the near future trend in development. This type development will favor simplification in equipment and short-cuts in processing. Many industries will undoubtely follow such evolution as time marches on."

Trend Noted in Redesign for Stamping

JOHN W. HIGGINS

President, Worcester Pressed Steel Co., Worcester, Mass.: "Whether the steel stamping industry will enjoy another billion-dollar year in 1949 is doubtful. Trends were varied with record volume in automotive stampings and substantially reduced volume in most other lines. Some weak firms are hard put to survive.

"In general, stamping companies re-evaluated their programs wherever possible to save money for their customers, to give a close scrutiny to fringe expenses, to select the lowest cost material that would do the job, to consider repair costs of aging equipment, and to consider the problems of handling uneconomically small orders. In many cases, extra shifts were eliminated.

"Among companies with experience in this field, there was increased emphasis on the redesign of parts made by other methods to take advantage of quick-acting presses. Trend toward the combination of small parts into larger units continued. Among the common problems receiving particular study were the testing of lubricants, elimination of annealing often through specifying different materials or slightly different analyses of stainless steel etc., and more efficient material handling.

"Time required to obtain stampings was greatly reduced in 1949. Customers lived on inventories to a large extent during the summer, but last fall orders started up again, and new customers are taking advantage of the increased values offered. The steel strike does not appear to have interrupted this recent trend. Improvement is not yet sufficient to bring stamping volume up to where it was before November, 1948."

Large Size Forgings Require Closer Steelmaking Controls

A. P. SPOONER

Metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa.: "Demand for forgings of increasing sizes, higher properties, for extremely high or low operating temperatures and for other severe conditions has necessitated more richly alloyed steels and closer control in all steelmaking and processing operations.

"To accommodate demand for large-size forgings, big ingot molds are being made available; one was recently reported capable of producing an ingot weighing more than 350 tons.

"The exacting requirements introduce new problems of steelmaking, pouring, forging, treating and testing. As one example, temperature control is extremely important; improved indicating instruments permit more precise temperature control than heretofore.

"The atomic age has introduced a new, interesting, but limited use for large forgings as components of big atom-smashing cyclotrons. These have required approximately 7000 tons of steel forgings for the five largest installations. Here maximum magnetic permeability is the most critical characteristic.

"Forgings to function in the chemical industry must meet a wide variety of conditions. Not only resistance to attack by the reagent being handled must be considered but such other factors as operation at very high temperature, subzero temperature or sudden changes over a wide range of temperatures. Homogeneous stainless steel vessels or stainless clad vessels are in increasing demand, and it is indicated that size of these vessels will likewise increase."

High Hardness and Strengths Trend in Heavy Forgings

A. F. FINKL

Vice president, A. Finkl & Sons Co., Chicago: "Probably the most noteworthy trend in the manufacture of heavy steel forgings since the end of World War II has been the demand for higher hardnesses and strengths, combined with greater comparable ductilities for heavily loaded machinery parts.

"In a great many cases the demand has been met by the use of chrome-nickel-molybdenum type 4340 analysis carefully forged in presses of proper capacity. Also involved are the closely controlled processes in cooling from the forging temperature, followed by annealing, and rough machining before heat treating. Heat treatment involves accurate heating control, quenching methods, and controlled drasticity and temperature of the quenching media. Tempering methods of closely controlled temperatures and temperature uniformity are also of paramount importance.

"Problem of finish machining heavy forgings at these high strengths and hardnesses is currently being studied by many manufacturers. Solutions in many cases have been worked out, and there is great promise of further progress in the not too distant future."

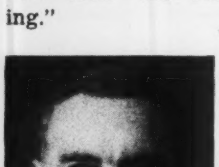
Better Forging Tools—Fruits of Research

EUGENE C. CLARKE

President, Chambersburg Engineering Co., Chambersburg, Pa.: "Significant advances are being made in forging, the forming of metal by impact, whether that metal be hot forged or whether it be stamped sheets. These are the direct result of new research studies made possible by electronic instrumentations which quickly provide accurate measurements as to striking energies and velocities, flow of metals, stresses in machine components and other pertinent data which has heretofore been unavailable.

"Coincidentally, a new engineering material, ductile iron, is filling the gap between cast iron and cast steel, and providing a superior material for the construction of impact machinery since its damping qualities are extremely advantageous. The same instrumentation that is promoting research is being developed into more accurate control of forging equipment.

"The products of these developments are being offered to the forging industry in the form of new tools far more durable, and far more productive than any available a few years ago. The work is continuing, and the demand for even more productivity and efficiency generated by higher labor and material costs will be met by new tools—the result of research into impact forming."



Ultrasonic Testing of Forgings Gains During 1949

A. O. SCHAEFER

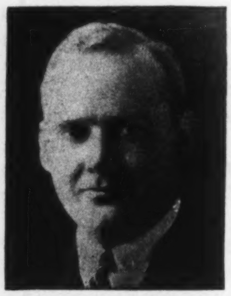
Assistant to the executive vice president, Midvale Co., Philadelphia: "Last year represents a period during which existing information was assembled, arranged, and made available. Use of forgings was extended into new fields, and inspection methods have been examined and appraised.

"In the American Society for Testing Materials, subcommittee VI of committee A-1, having to do with steel forgings, completely revised all existing specifications in the light of present day knowledge. All ASTM specifications for steel forgings were included. This revision represents the most thorough overhauling ever given this set of specifications. The revised specifications are being published in this year's ASTM Book of Standards.

"Members of the industry published a manual, bringing together for the first time all data considered pertinent for the design, specification, and use of forgings.

"The year was marked by the increasing application of ultrasonic testing to steel forgings. While no approved technique, and certainly no common ground for the interpretation of results has been reached, it is generally agreed that the industry and its consumers are on the way towards accumulating the necessary experience with this method of testing.

"Forgings have become recognized as useful and serviceable for anvils for large hammers. Stainless and other high-alloy steels have been used for forgings on increasing sizes."



Technical Progress Opens New Markets for Hydraulic Presses

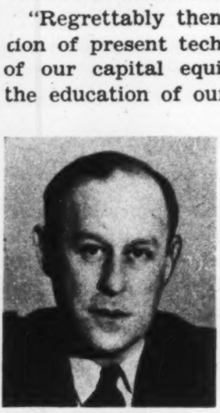
R. E. DILLON

President, Lake Erie Engineering Corp., Buffalo: "Technical progress and new developments in the application of hydraulic presses for metal working operations have come with extreme rapidity in the last year or two as they have in all metal working operations. Such new developments should invariably create large added markets.

"Peak of postwar expansion buying is past; we must now rely on new business either for (1) replacement of worn out equipment or for (2) substitution for other less efficient processes. Yet these only two markets are seriously reduced; in the first case by tax structure as related to depreciation and in the second by the present complete inability of industry to plan ahead. Uncertainties over the future are created by equal uncertainties over government dictation of labor policies, possible interpretations of government control over business and in summary, government allusions to statism.

"Remove these greatest of deterrents to sales and the capital equipment industry and its employees will expand and prosper as never before. Fail to remove them and intelligent management cannot invest in new capital equipment to any expanded degree, regardless of the technical advances embodied in that equipment. What purchaser can be swayed to install machinery that will save 'X' dollars per hour if he cannot foresee with reasonable certainty the number of hours per week or per year during which the equipment may be expected to run and produce those savings for the investors who have contributed the purchase price?

"Regrettably then, our biggest problem in the utilization of present technical development and the expansion of our capital equipment industries and their sales is the education of our government representatives."



Straight Carbon Steel of Precise Hardenability Sought

D. A. BARNES

Chief metallurgist, Transue & Williams Steel Forging Corp., Alliance, O.: "There is a large tonnage of forgings made from straight carbon steel of 0.35 to 0.55 carbon which is required to be heat treated to definite hardness and physical specifications. The erratic response in heat treatment of the straight carbon grades definitely leaves much to be desired.

"To the best of the writer's knowledge, there has been no hardenability test for straight carbon steel yet developed which is acceptable to the steel producers. We are looking forward to the time, which we hope is not too distant, when we may purchase straight carbon steel to a guaranteed maximum and minimum hardenability at no increase in price."

JOINING and WELDING

Demand for fasteners to continue heavy . . . Ultrasonic unit facilitates flash butt weld cycles . . . Higher arc welding speeds predicted . . . Powder cutting slashes costs 50 per cent . . . Aluminum, copper welding refinements expected

New Metallic-Arc Process Efficiently Welds Stainless

FRANK ASCHENBRENNER

Assistant director, research and engineering, Air Reduction Laboratories, Murray Hill, N. J.: "One of the most important laboratory developments in recent years was the inert-gas-shielded metallic-arc welding process, which emerged from the research area a little over a year ago for welding of aluminum.

"Continuing development work in the past year has brought the process from research to commercial application stage for both bronzes and the stainless steels—and in the laboratory, the process has been successfully tried on the other commercially weldable metals. In the near future, as research continues toward commercial applications, we expect to see other important metals added to the list of those welded by this increasingly important process."

High Frequency Pipe Welding —Outstanding Development

G. N. SIEGER

President, S-M-S Corp., Detroit: "The new emphasis in the resistance welding industry this year has been the greater acceptance of balanced power loads. This is accomplished in several ways but the end point is the same: A balanced electrical load. Heretofore the availability was greatly restricted where now it is most easily obtainable.

"Because of the increased interest in balanced electrical loads the homo-polar generator is receiving greater attention. This was described several times in the press so it need not be redeveloped. One of the really new developments has been the 'slope control' in resistance welders which is especially valuable in spot welding of aluminum which was heretofore considered impracticable.

"That users of economical devices are becoming more desirous of learning the fundamentals of the process during the last year is shown by the number of articles appearing in the technical press which was greater last year than in any several years. We have been privileged to scan a new book on resistance welding which is a work of art and will contribute much to elimination of the waste which now follows haphazard design due to lack of appreciation.

"An outstanding contribution of the year is in the incorporation of high frequency in a large electric pipe welding machine."

Cold Welding Nonferrous Metals Get Attention

ROBERT E. KINKEAD

Consulting engineer, welding, Cleveland: "During 1949 steady advances were made in broadening the application of welding processes to ferrous metals and increasing welding speeds. A really good welding transformer in the price range of $40 made its appearance. In nonferrous metals, wire feed Heliarc was demonstrated to be successful. Titanium was welded with Heliarc. Wider use of 347 stainless increased field of application of Heliarc.

"Cold welding of nonferrous metals was brought to American attention. Since the process seems to be in its early stages of development, it is too soon to predict what American ingenuity will do with it. Cold welding of ferrous metals was achieved by Dr. Bridgeman some years ago as an incident to his exploration of such metals under enormous pressure loading. The classic experiment of pressing two perfect surfaces, one copper and the other steel and having the copper migrate into the steel is well known."

Structural Work Improved with High Tensile Bolts

HERMAN H. LIND

President, Industrial Fasteners Institute, Cleveland: "Recent research indicates the probability that structural joints fastened with high-tensile bolts have improved properties of rigidity and endurance. Such bolts have a yield point of at least 85,000 psi and are torqued to the yield point. The required torque can be estimated as 0.2 in.-lb per inch of bolt diameter, per pound of bolt load. In order to sustain this high clamping load, heavy carburized washers are installed under the bolt head and nut. The shear-directed load such a joint will sustain without slipping can be estimated from the coefficient of friction, which is about 0.35 for mill-scaled structural steel. Besides providing a rigid joint, the high clamping power of these bolts insures load transfer from plate to plate by friction at areas remote from the hole, thereby avoiding high stress near the hole.

"Anticipated use of such bolts is in joints where fatigue is a factor, joints requiring high rigidity, as fitting-up bolts to be left in place, and in alloy structural steels where stress concentration near the bolt hole may be objectionable."

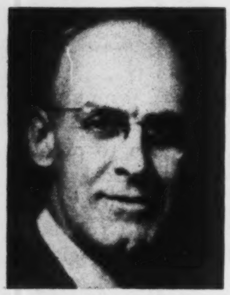
Brazing Gives Designers Versatile Manufacturing Tool

N. M. SALKOVER

Salkover Metal Processing, Cincinnati: "Ours is the specialized field of commercial metal joining by all recognized brazing methods. Modern brazing gives the design engineer a most versatile tool for economical manufacturing. Usually cost reduction can be achieved by producing relatively simple components on automatic screw machine and stamping press, brazing them together to make the complete unit. Strength of the final assembly is generally equivalent to that of one-piece construction.

"Probably the most significant brazing development of the past year has been the greatly increased use of copper brazing by the automotive industry. Fluid transmission parts and many others are now fabricated in that way. Other types of metal fabricators covering a wide range of products have also recognized and adopted brazing because it has reduced cost and frequently improved quality.

"We are optimistic about the future of our industry. With cost reduction increasingly important, even those manufacturers who have been most resistant to change are examining their products for brazing possibilities."



Structural Welding Applications Seen Gaining

LAMOTTE GROVER

Welding engineer, Air Reduction Sales Co., New York: "Applications of welding for major structural and fabrication purposes developed considerably during the past year. Along with a slackening of demand for large volumes of post-war steel construction, building costs are receiving more emphasis, with a resulting increase in welded construction. Recent large welded building projects in Houston alone have totaled more than 15,000 tons of steel; the Jordan Marsh store in Boston, covering an entire city block, is being rebuilt a unit at a time using welded construction; and a cost reduction of 22 per cent was realized on a 200-foot span rigid-frame pier shed, 1150 feet long, at Long Beach, as welded construction continues its steady growth.

"In fabrication, welding has now replaced other methods almost altogether for bodies and underframes of railway passenger cars, and largely so in building freight cars. Welded cars in general have a splendid service record. From a comparatively few minor difficulties in experience, and from research studies, details of welded design have been developed to withstand the severe abuse that freight cars receive under present day conditions, such as humping and use of vibrator shaker machines to facilitate unloading of hopper cars."

"Slope Control" Permits Accurate Current Regulation

J. T. BAILEY

Manager, electronic and regulator sales division, control divisions, General Electric Co., Schenectady, N. Y.: "Ready acceptance of 'slope control' for single phase welding has been amply demonstrated since its introduction in 1948. This control, used in conjunction with electronic control with heat adjustment, permits accurate regulation of initial application of current from minimum to final values suitable for welding.

"Major benefits which have been proved in the laboratory and the field include increased tip life through less tip pick-up (especially when welding aluminum alloys), less spitting, successful application to projection welding of aluminum and cadmium or zinc plated steel without expulsion, less porosity and improved weld quality. The control is designed to fulfill air force aeronautical specification AN-W-30."

Inert-Gas-Shielded Arc Process Aids Auto Makers

F. J. PILIA

Development engineer, Linde Air Products Co., New York: "The automotive industry employed inert-gas-shielded arc welding very successfully last year for welding fenders, bumpers, bumper guards and body panels. Its high quality of results made possible the use of multiple stampings to obtain desired contours on bodies and fenders.

"Fixtures can be made with hold-down bars spaced as closely as ⅛-inch from the center line of the weld, promoting excellent control of distortion and burn-back. Good fixtures also allow welding in all positions with comparable results.

"Five major automobile manufacturers are now using the method on their current models, and as many more are preparing for its use on future models."

Sees Greater Use of Arc Welding This Year

C. I. MacGUFFIE

Manager of sales, welding divisions, General Electric Co., Schenectady, N. Y.: "Great advances were made during 1949 in developing welding techniques for faster and better quality welding of nonferrous metal. In particular, the inert-gas shielded welding of aluminum was extended to heavy pressure vessels and large storage tanks. Many automatic and semiautomatic welding installations of this comparatively new process were placed in production.

"Continued extension of the use of low-hydrogen types of coatings on electrodes in the low field helped extend the use of arc welding in the ferrous alloy field.

"We expect in 1950 to see development continued in these same fields with the resultant increased use of arc welding on previous hard-to-weld metals."

Powder Cutting Improvements Cut Costs by 50 Per Cent

E. M. HOLUB

Development engineer, Linde Air Products Co., New York: "During recent years powder-cutting and scarfing processes were used at a steadily increasing rate for preparing and fabricating stainless steels. Conditioning of stainless steel ingots, slabs, and billets by powder-scarfing, in many instances, resulted in appreciable lower production costs. Recent equipment developments are making it possible to triple previous operating speeds and reduce conditioning costs as much as 50 per cent.

"Low-cost conditioning should bring about a wider usage of the method. Field studies on certain grades of stainless show that, besides lowering conditioning costs, new powder-scarfing apparatus and techniques permit the realization of superior products."

Changeover Seen in Wire Drawing and Extrusion Dies

WM. G. WALTERMIRE

Chief products engineer, Lamson & Sessions Co., Cleveland: "New unified 'clearance type' screw threads focused attention on changeover in wire drawing dies and extrusion dies. The large using industries are leading in changing their standards and manufacturers are ready to supply new threads.

"Almost every company has been obsoleting its old machinery and equipment. In general, one new machine does the work of two old ones better and at lower cost. Old limitations on size and materials are fast being removed as a result of this and of improvements in ferrous and nonferrous wire and rod during the year.

"Several companies have improved their wire mills, adding spheroidizing quenches and modern pickling units to produce better surface conditions. On the product finishing end modern gas and electric atmospherically controlled furnaces are gradually replacing the old."

Arc Welding To Make Even Greater Progress in Future

A. F. DAVIS

Vice president, Lincoln Electric Co., Cleveland: "Arc welding is as vital to industry as is steel itself, both as a repair and maintenance tool and as a universal 'putting on' tool. If for some reason all welding were stopped today, within 2 weeks industry as well as public utilities would either be completely halted or badly crippled in their operations.

"Yet arc welding has only scratched the surface of its total potential contribution to the progress of industry towards economy and quality in production. The next 50 years hold possibilities of even greater advances than have been made in the first 50 years of arc welding.

"To inherit this promising future, the arc welding industry must not only continue to step up through technological advances but must consistently lower the cost of its products while increasing the quality of its services. This is a responsibility that must be shared by management in welding equipment industries, workers in those industries, and by the men who hold the stinger and burn the rod.

"The most critical problem in our industry, and it is one common to all industry, is that of reversing the trend, now prevalent, of doing less and expecting more for it. We must put more into our products and ask less. The only people who can accomplish this job are the people working in industry. When everybody feels a lively and personal responsibility for the job and is given recognition for accomplishments achieved, then the job will be done. The arc welder will be as universal as a hammer."

Use of Silver Brazing Alloys Being Widened

A. M. SETAPEN

Manager, Engineering Division, Handy & Harman, New York: "While we would very much like to comment on new, outstanding applications in silver brazing, we regret that there doesn't appear to have been anything unusual developed recently which would be worthy of special mention. Use of low temperature silver brazing alloys has increased since the end of the war but this increase has been the result of increased production rather than new, outstanding applications."

Two Aluminum Welding Methods May Help Cut Costs

G. O. HOGLUND

Chief, welding development division. Process Development Laboratories, Aluminum Co. of America, New Kensington, Pa.: "There have been some very interesting developments in welding aluminum materials during 1949. One of these, the consumable electrode inert-gas metal arc welding process, has been used in limited production. Another, for welding these materials at high pressures and low temperatures, is still in the laboratory stage. Both have potential possibilities of reducing costs and opening new applications of aluminum alloys.

"The consumable electrode process was mechanized during 1949 for welding heavy plate. Production application of the procedure indicates that lower overall costs for welding heavy plate can be achieved. In addition, exploration of the mechanical properties of welds in some of the heat-treatable aluminum alloys and the higher strength nonheat-treatable alloys indicates they are greater than can be obtained with other welding procedures. Further development and wider use of the process can be anticipated."

Argon Metal Arc Welding Boosts Aluminum Fabrication

H. T. HERBST

Development engineer, Linde Air Products Co., New York: "Argon-shielded tungsten-arc welding provided a great impetus to the fabrication of aluminum alloys during the past several years. It made it possible to readily fabricate aluminum to code specifications requiring x-ray examination. Heliarc welding was particularly suited to the lighter gages of metals where welding rates were rapid and the cost of the shielding gas required resulted in overall costs not out of line with other methods of welding. On the heavier plate materials, however, the welding rates are slow and the cost of the welded joints relatively high.

"First successful application of mechanized argon-shielded metal-arc welding to aluminum vessels subject to code specifications occurred during 1949. This involved plates from ½ to 1¼ inch thick and 2S, 3S, and 61S aluminum alloys. Although problems of controlling porosity were greater than with the tungsten-arc method, this hurdle was successfully overcome."

Quality Control in Welding Must Not Relax—But Advance

R. B. LINCOLN

Director, National Weld Testing Bureau, Pittsburgh Testing Laboratory, Pittsburgh: "Welding has made an excellent safety record. There are very few structural failures that can be traced to defective welding, and this has been a potent factor in making its use more general. Almost every line of contracting and manufacturing uses welding somewhere.

"Because of the increased use of welding, a few words on quality control may not be out of place. We must not go backwards. The inspection and testing procedure will differ from job to job but there are certain general principles that always hold true.

"Unless there is an authentic record of a previous test, the procedure should always be qualified. Manual operators should always pass qualification tests. These tests assure us that the procedure and operators can make good welds, and it is the duty of the inspectors to see that they do."

Up-To-Date Data on Welding Design Needed

A. P. YOUNG

Acting head, mechanical engineering, Michigan College of Mining and Technology, Houghton, Mich.: "In thumbing through several textbooks on machine design recently, I found that welding was discussed as to process, strength on basis of stress, analysis of stress in certain types of joints, nomenclature, symbols and definitions.

"In none of them was there any presentation of material which would inspire the college student to undertake creative design using welding as a process of fabrication.

"It is my feeling that management and engineering departments in industry should get together with authors of textbooks and co-operate in publishing latest information on design for welding and applying welding to design. In these there should be presented to students enough data on methods and means to enable them to choose between or among casting, processing methods, forging and welding, or a combination of all in designing machines the most economical way."

Higher Speeds, Lower Costs Trend in Arc Welding

C. H. JENNINGS

Engineering manager, arc welding department, Westinghouse Electric Corp., Buffalo: "Trends in arc welding continue toward improved equipment, higher welding speeds and lower costs. In the equipment field, a new rectifier-type direct current welder, available in 200, 300, and 400-ampere ratings, offers many features, such as increased efficiency, reduced no-load losses, reduced kilovolt-ampere and kilovolt demand, quiet operation and reduced maintenance. It employs a 3-phase transformer and a full-wave selenium rectifier. It brings to the welding industry a direct current arc welder with the mechanical and electrical advantages of alternating current equipments.

"Submerged melt welding by the twin arc process is steadily growing in importance, particularly in the pipe welding field. This process employs two arcs in tandem, spaced less than 2 inches apart.

"Alternating current welders are used as the power source for both arcs, and welding speeds of 130 inches per minute for ¼-inch thick plate are possible. In fact, welding speeds are primarily limited by ability of the mechanical equipment to handle the work pieces."

AC Current May Provide Better Copper Weldments

J. R. HUNTER

Manager, welding section, Revere Copper & Brass Inc., Rome, N. Y.: "Fabrication of copper and copper alloy weldments has been marked by the widespread use of inert-gas shielded tungsten arc welding. For the most part, straight polarity direct current and argon have been employed for the low conductivity and more readily weldable alloys such as silicon bronze and cupro nickel. The greater heat accruing from the greater arc voltage in a helium atmosphere has been utilized to both extend the usefulness of available equipment and to minimize or eliminate preheat requirements in the welding of higher conductivity metals such as the brasses and copper.

"Success with which the process has been employed has varied. Relatively slow welding speeds combined with relatively large numbers of passes involved in welding plate thicknesses aggravates distortion tendencies and related difficulties.

"While use of alternating current has not been fully investigated, there are indications that with proper equipment of adequate capacity, its use should be attendant with decreased or complete elimination of oxide interference with coalescence of fused base and filler metals. This should permit use of larger welding rods in the deposition of fewer passes at increased speeds and overall lower costs."

Great Future Seen for Electric Arc Welding

PIERRE CHAMPION

President, Champion Rivet Co., Cleveland: "Rivets are the old tried and proved method of joining two pieces of steel together. Their use over the years has been accepted by design engineers and fabricators, and will continue to be used in quantity as long as we have steel to join together.

"Electric arc welding is relatively an infant industry, and has been looked on with skepticism by some of the older heads in the fabricating industry. Much like a new born son, they wonder if he will grow up to be as good as his progenitors. As a matter of fact, just prior to World War II, and certainly during our rearmament program, welding became of age. The speed with which we built our merchant fleet, our capacity to produce high octane gasoline for the Air Force, and the thousands of miles of welded piping required in atomic bomb production, prove conclusively that electric arc welding is here to stay, is definitely a part of our plate fabricating facilities and is largely responsible for this country's position as the most highly industrialized nation."

Inert-Gas Shielded Welding Applications Increasing

H. A. HUFF JR.

Welding specialist, Air Reduction Sales Co., New York: "Last year saw the emergence of inert-gas shielded arc welding processes as two well-developed welding teams, capable of coping with any commercial thickness of aluminum, stainless steel, and other metals. While refinements in the Heliwelding process, using a nonconsuming tungsten electrode, tended toward more and more automatic and mechanized production welding work, the newer Aircomatic process, with a continuously fed consuming filler wire electrode in an inert gas blanket, made rapid strides.

"Problems and questions in the aluminum welding field were met and solved for both manual and automatic applications of this method. Today's results on aluminum are fully comparable to those obtained by other processes—and they are obtained at remarkable savings."

General Usage—Aim of Current Welding Refinements

E. R. BEHNKE

Development engineer, Linde Air Products Co., New York: "Apparatus design specifications have narrowed considerably in the past 2 years for conventional inert-gas shielded arc welding using tungsten electrodes. Trend now is toward refinement of existing designs for general usage, rather than development of special apparatus for limited use. For example, improved methods of gripping electrodes have been conceived; ceramic gas cups with better refractory properties have been produced; and leak-proof connections for argon and cooling-water lines have been introduced. Possibly the greatest problem has been production of apparatus of 'rugged' construction which is light and flexible.

"Applications requiring hand-welding of thin-sheet stainless steel and high-temperature alloys with the Heliarc torch increased recently. Smaller and lighter torches for maneuverability at very low currents are required. These uses are expected to expand in 1950 for applications such as jet-engine construction and repair."

Ultrasonic Unit Facilitates Flash Butt Weld Cycles

I. A. OEHLER

Director, metallurgy and research, American Welding & Mfg. Co., Warren, O.: "Flash butt welding, now widely employed in the fabrication of heat resistant alloy components for aircraft gas turbines, is currently being used on a production basis for aluminum alloy parts for those engines and other aircraft applications. Welding machine settings are critical, and it has been found that the use of ultrasonic testing equipment facilitates establishment of weld cycles and serves as a reliable inspection tool on flash welded parts.

"Titanium has been flash butt welded experimentally and high quality welds that approach parent metal in properties can be obtained without the use of protective atmospheres.

"The consistent high quality of the welds produced makes this method of joining ideally suited for the production of parts involving either high cost materials or subsequent costly machining operations."

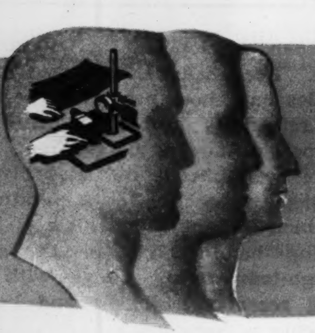
Heavy Demand for Fasteners To Continue This Year

GEORGE A. TINNERMAN

Vice president, Tinnerman Products Inc., Cleveland: "To take advantage of the tremendous potential market for fasteners the world over, we are launching an energetic expansion program this year, both at home and abroad.

"Heading the list is completion of a new, highly efficient plant, designed to assure maximum production and quick service to our customers. Our decision to intensify our overseas operations was based on the results of a visit made to Britain and France last fall. We found our European licensees already had developed a large market for our products, but we also discovered that a much greater sales potential exists in many areas.

"Sales-wise, our prospects for 1950 are more than encouraging. Every year, since the first introduction of our brand of fasteners, our sales have grown to new highs. Last year was no exception. With the development of several revolutionary new fasteners last year, our range of products now numbers more than 4000 varieties and shapes, and demand for these products grows steadily month by month."



INSPECTION and TESTING

Industry to benefit by scientific quality control . . . Volume of spectrographic work boosted by research . . . Analysis of several elements at once is objective . . . Nondestructive testing aid to production

Sonic Testing Training Expensive But Worthwhile

R. W. SNOWDON

Special engineer, Heppenstall Co., Pittsburgh: "Until recently, there has always been the serious and unsolved problem of determining internal soundness of metal parts. External inspection of a product can be of little value if internal defects cause it to fail in service. Several electronic nondestructive testing devices on the market today have become important factors in determining the location, size and cause of internal defects in forgings.

"The most successful of these instruments employs high-frequency sound. Sonic testing, as the technique is called, has already made remarkable strides toward the solution of the mysteries surrounding the cause and effect of defects in forgings.

"One of the principal problems with this type of inspection is the training of competent machine operators who must have confidence in their work. This confidence can be gained only by the destruction of large quantities of material to give them a visual picture on which to base future interpretations. Initial training and development is expensive, but it is felt that improved quality of forgings made possible by the use of sonic testing is very worthwhile."

Analysis of Several Elements At Once Ultimate Objective

M. A. CORDOVI

Staff engineering, Babcock & Wilcox Co., New York: "In the early part of 1948, a new instrument known as x-ray fluorescence analyzer became commercially available. This instrument was designed for rapid quantitative and qualitative analysis of elemental constituents in metals, minerals and ores. Initial experiments indicated that the instrument, as designed originally, was inadequate for routine analysis of metals in view of its inability to reproduce results within desired limits of accuracy.

"During 1949, several industrial concerns undertook to re-engineer the original unit to make it meet standard requirements in analysis of metals. In this connection it may be reported that the x-ray fluorescence analysis unit is now capable of analyzing certain elemental constituents of metals with an accuracy of 1 per cent of amount present. The average time required for such an analysis is 3 minutes per element.

"We are looking forward to even greater improvements in this instrument during the next year. Present work is directed toward increasing the accuracy of the unit still further as well as making it more universal in its scopes. Automatic recording of simultaneous analyses of several elements is the ultimate object of researchers in this field."

Industry To Benefit by Scientific Quality Control

J. R. STEEN

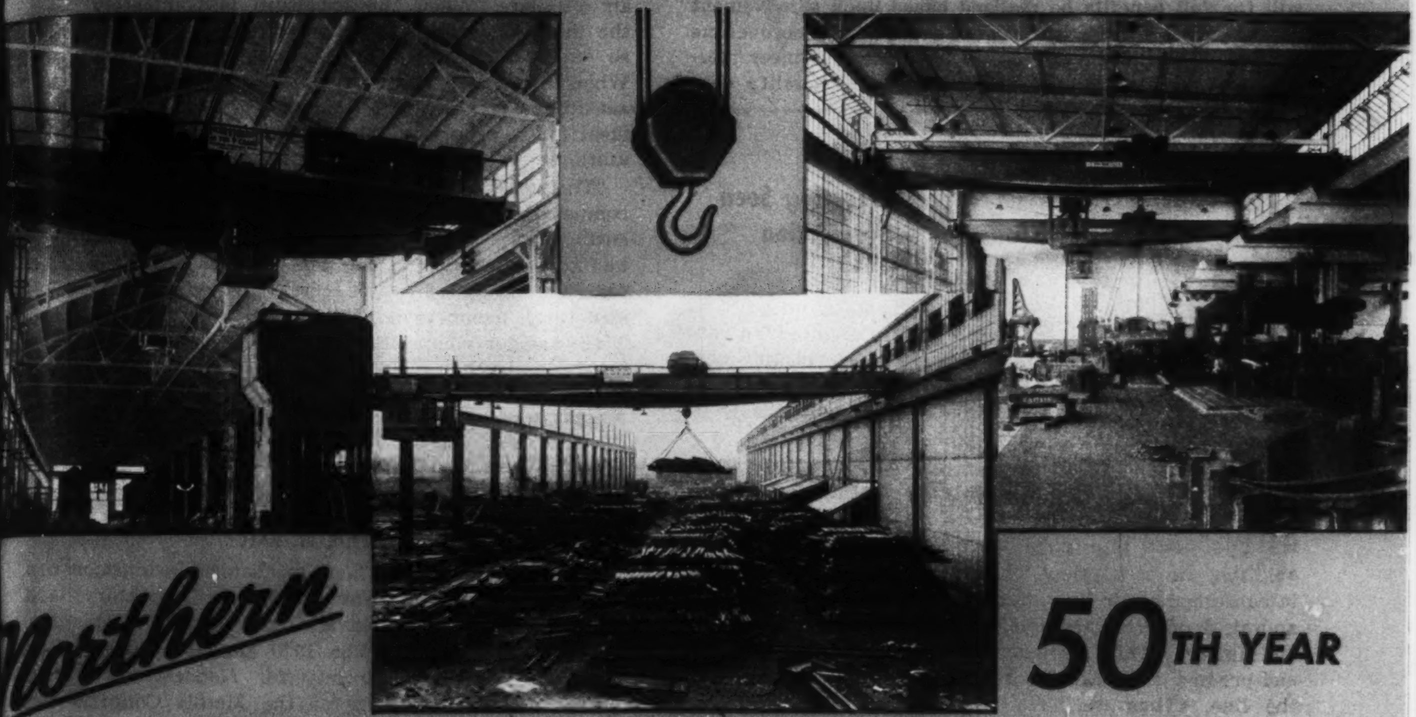
Director quality control, Sylvania Electric Products Inc., Flushing, N. Y.: "Although 1949 marks the Silver Anniversary of the perfection and reduction to practice of scientific quality control principles by Dr. W. A. Shewhart, it is also very surprising to find how few people have more than a cursory knowledge of the subject or realize what the application of these principles might be able to accomplish for them were they but given a chance.

"Even though great strides have been made in the past few years, including formation of a professional quality control society, a professional group for quality control within a large engineering society, and sponsorship of many abbreviated courses, something much more fundamental is required before the quality control activity will be considered as indispensable as cost accounting, personnel management, production scheduling or time and motion study.

"It is believed that the next great forward surge in scientific inspection and quality control activities will result not from just an extension of the present movement, but from a general revision of the educational curricula in our engineering schools and colleges. These revisions will provide for fundamental courses in general quality control subjects for all undergraduate engineers, many of whom will become our administrators and executives in the years that are to follow.

"It is believed that in this way and in this way only

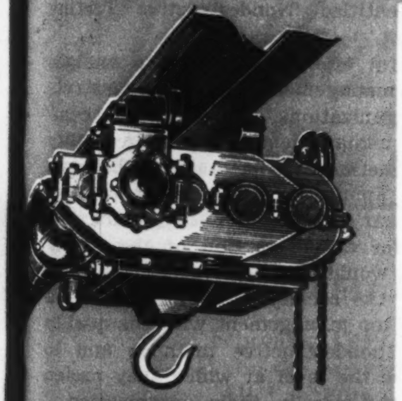
For Fast, Continuous Overhead Material Handling



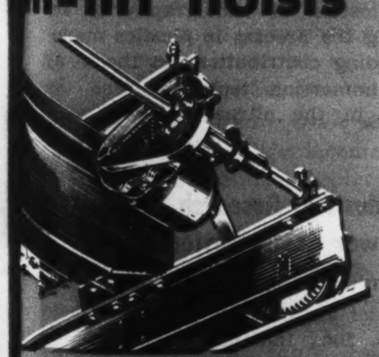
Northern

50TH YEAR

overhead electric traveling cranes



hi-lift hoists



travelators

Designed and constructed for severe, heavy duty service, NORTHERN CRANES are available in three basic types: (1) NORTHERN SUPER CRANES, from 5 to 100 tons capacity; (2) NORTHERN STANDARD or LOW HEADROOM CRANES, from 1 to 20 tons capacity; and (3) NORTHERN HOIST CRANES, from 1 to 15 tons capacity. They combine a higher design factor of safety than is usually specified, with machine tool precision, including: turned and ground shafts—heavy duty roller bearings—oil tight transmission housings—extra heavy girder sections—machine cut steel gears—heavy duty crane type motors, etc., for any span, electrical current, or operating condition. Ask for Catalog ST-712.

NORTHERN ELECTRIC HI-LIFT HOISTS, in models from 2000 to 30,000 lbs. capacity (up to 100 tons in stationary types), provide unusually high hook lift, adding from 12″ to 36″ to the working height of your building. They operate on standard I-beam, monorail, or tramrail systems. Special hoists also available include: double hook—stationary—bucket hoists; floor or cab controlled; single or variable speed. Ask for Catalog HT-110.

The NORTHERN TRAVELATOR is a simple device to convert hand powered cranes to motorized control, to increase operating speed. Your own men can install it in a few hours. Ask for Booklet T-20.

NORTHERN ENGINEERING WORKS—DETROIT, MICHIGAN

HEAVY DUTY CRANES—LOW HEADROOM CRANES—BUCKET CRANES—TRANSFER CRANES—ELECTRIC HOIST CRANES—HAND CRANES—ELECTRIC HOISTS—AIR HOISTS—SPECIAL CRANES AND HOISTS.

NORTHERN ENGINEERING WORKS

General Offices: 2625 Atwater St., DETROIT 7, MICH.

BUILDERS OF CRANES AND HOISTS EXCLUSIVELY will the full benefits be realized based upon a movement the universal acceptance of which long has been overdue but which should develop rapidly once the engineer realizes that his is the real responsibility for quality control—the quality of design."

Nondestructive Testing Seen Invaluable to Production

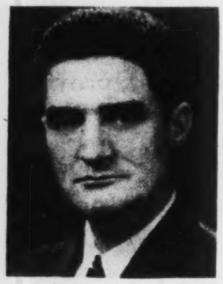
F. B. DOANE

President, Magnaflux Corp., Chicago: "Nondestructive testing continues its advance, developing new fields of application and improving the methods, materials and techniques already in use.

"As the tremendous demand for manufactured products has created postwar shortages, these shortages are now one by one being converted into ready supplies; in some cases, into surpluses. Thus the recent cry for anything at any price, which was particularly evident in consumer goods lines, has given way to a more critical appraisal of price and quality, with particular emphasis on quality. This ingredient cannot be applied to the end-product like 'finish', it must be 'built in' all along the line. Thus we have a description of one of the valuable functions of nondestructive testing; namely, to test purchased materials for uniformity and quality, and to test the product itself at various stages of its manufacture.

"Inspection equipment specially built for use in individual production lines still holds the center of interest. Such machines are often placed at several convenient stages in the line, thus making the operations of nondestructive testing an integral and permanent part of the process of production.

"Problems faced by this industry are varied and interesting but it seems to the writer that its chief problem is one which is shared by industry as a whole. That is to do a far better job of educating and informing the general public as to what it has done, is doing, and can do toward maintaining the Nation's welfare and the highest standard of living of any in the world."



Sees Wider Useage of X-ray Gage During 1949

W. C. HUTCHINS

Manager, Special Products Division, General Electric Co. Schenectady, N. Y.: "The x-ray thickness gage proved to be a valuable instrument within the steel industry during 1949, and it is expected to come into even wider use in 1950. It enables a gage to be reached on the first strip, whereas formerly four strips could go through the mill before a gage report was obtained. Obviously, this is especially advantageous when rolling short orders.

"Allied to the x-ray gage is the beta-ray gage which is designed for monitoring thickness of steel, brass, and other metals up to 0.020-inch or 0.030-inch.

"The leak detector has proved extremely valuable for locating and plugging leaks in the fabrication of various pressure and vacuum vessels. With the detector it is necessary only to pour in a little Freon and then apply air pressure. When the enclosure is completely filled, the instrument is so sensitive that it will detect a leak so small that only 1 ounce would leak in 100 years. When only one per cent of the gas is used with air, the sensitivity is a leakage of 1 ounce in 1 year. This is ideal for refrigerators, evaporators and condensers, radiators, engine blocks, oil tanks, and heating systems.

"The new metals comparator permits the operator to compare metals by merely placing a portable head on the surface of materials, whereas previously the material had to be placed in a coil. This has proved most useful for the testing of large rods, sheet metal, and heavy structural members which cannot be placed in a coil. Tests are for composition, heat treatment, and case hardened depth."

Nondestructive Testing Aimed At Preventing Scrapped Parts

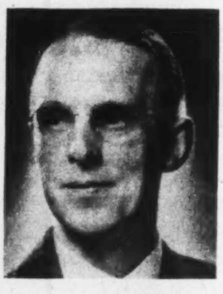
LESLIE W. BALL

Chief, mechanical evaluation div., Naval Ordnance Laboratory, U. S. Naval Gun Factory, Washington: "The 1949 annual meeting of the Society for Nondestructive Testing at the Metals Congress was a real turning point in the progress of the inspection and testing profession. Technical sessions were of extremely high level, and were attended up to or beyond the capacity of the meeting room. The most significant session was the one entitled 'Nondestructive Testing in Industrial Management.'

"A real and successful effort was made to analyze the basic attitudes of management toward nondestructive testing in their organizations, and a detailed comparison was made with management's interest in quality control by statistical methods. Whereas in the past nondestructive methods applied to final inspection have produced scrap, this year's emphasis was on the use of the same methods for the prevention of the manufacture of material that would become scrap.

"In the coming year the society is going to make a major effort to impress top management with the quality control possibilities of nondestructive methods and to try to get them to raise the level at which they assign responsibility for the methods in their organization.

"On the technical side, the advent of xeroradiography and the successful application of radiography to investigating and controlling the process in plastics manufacture were the outstanding contributions in the x-ray field. Success of the immersion technique was the outstanding development in the ultrasonic field."



Industrial Research Aims at Lower Costs, Better Quality

ARTHUR E. FOCKE

Chief metallurgist, Diamond Chain Co. Inc., Indianapolis, and president, American Society for Metals: " 'Economy in Production', theme of the 1949 National Metal Congress, continues to represent the current trend in much industrial research. Ability to apply modern scientific developments to the production and processing of metals so as to provide better products

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

MOTOR EXCHANGE SERVICE

For Westinghouse
single-phase and three-phase
1 to 20 hp
frame 203 to 326 a-c motors

Another Life-Line First!

The Broadest Exchange Plan!

Since February, 1949, Life-Line motors have offered you the broadest exchange plan in industry. All 1 to 20-hp, single-phase and three-phase a-c motors in frame 203 to 326 are included. No other manufacturer of motors—large or small—provides exchange service that compares in scope to this new Life-Line Motor Exchange Service.

120 Westinghouse exchange points assure you rush motor replacement service anywhere in the United States. Replacement motors, covered by this plan, are in stock, ready to be speeded to you at any time.

And what's more, if a motor fails during warranty period, it may be exchanged *free* for a motor of identical rating. The *exchange price,* beyond warranty, *is not dependent on the time in service . . . one year, five years or ten years.*

This service is one more advantage you get with Life-Line motors. Add this to all-steel construction . . . pre-lubricated bearings . . . an indicated savings of $750 per year per 100 motors . . . and you'll see why Life-Line has gained leading acceptance in the motor industry.

Complete details on the Life-Line Exchange Service—lists of exchange points and motor ratings covered—are given in the new booklet SM-5243. Get your copy today from your nearby Westinghouse representative or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21533

Westinghouse Life-Line Motors

at lower costs is one measure of a metallurgist's right to call himself an engineer.

"But it is difficult frequently to be sure that a new process or a different material will result in real economy. Arbitrary and inconsistent 'extras', changing freight charges or their absorption, increased payments for direct labor as well as the limitations imposed by complicated international maneuvers may nullify the results of detailed research and development effort. However, the importance of costs and the need to reduce cost without damaging the quality or better yet with simultaneous quality improvement is one of the reasons for research.

"Many of us in this field find it difficult to obtain satisfactory data on costs without carrying through detailed, expensive, and time-consuming tests or investigations. It would seem that our technical societies could perform a real service by providing factual data on the cost of various basic products when made in different materials or produced by various processes."

Volume of Spectrographical Work Boosted by Research

W. B. COLEMAN

W. B. Coleman & Co., Philadelphia: "Being closely associated with inspection and testing of metals, it has been observed that during the past year there has been a marked trend toward a better control for quality. This covers the composition of metals and alloys as well as various physical constants derived from destructive tests and also defects determined by nondestructive testing.

"The engineering profession is looking for materials that will give greater strength without increase in weight. In the airplane industry interest is centered in lighter weights as well as resistance to fatigue and vibrational stresses.

"Spectrographic work has shown a marked increase in volume, much of the increase being work on impurities in the less common elements. Titanium metal and its alloys is a very prominent field today. Much research is being carried on with this very common yet slightly used metal. Many interesting applications are being discovered and long tests must be conducted to merit its use for particular applications.

"Nodular cast iron has taken the cast iron industry by storm. There are several ways of producing it and both the magnesium and cerium methods are being used. The increased physical properties together with elasticity have made this a popular metal. Anyone producing metal in this field should have the structures carefully studied by the miscroscope."

Instrument Production Revives in Europe

GEORGE SCHERR

President, George Scherr Co. Inc., New York: "The war stopped importation of instruments and machine tools from Europe almost completely. Many factories we formerly represented, such as Reinecker for gear hobbing machines, Zeiss Jena for optical measuring instruments, etc., are now in the Russian Zone of Germany or entirely dismantled. No deliveries can be expected from these sources for the time being.

"To investigate new possibilities, the writer went to Europe. In Germany the destruction by bombs is so extensive that most of the remaining industrial capacity will be needed for many years for home consumption and rebuilding. Germany, it may be said, is today a country with an unlimited demand for everything, from a pin and nail to locomotives, but with a very limited amount of capital to get a start. What a chance for private capital investment if conditions can be stabilized!

"One of the factories we represent is the firm of Ernst Leitz, Wetzlar, near Frankfort. This town escaped serious damage. The Leitz factory is in full operation and we are again able to obtain shipments of optical measuring instruments such as toolmakers microscopes.

"In Italy we were surpised to see an extensive growth of a new machine tool industry. At the Milano Trade Fair practically every type of machine tool was exhibited. The designs follow former German types; the workmanship and visible finish is excellent and on a par with tools from Switzerland. It is interesting to note that Italy came to this new industry with the active assistance of their former ally in the War, Germany. Germany, in order to get needed machines, sent experts with drawings and know-how to Italy to build their tools. Here is a new, ruinous competition for Germany, created by themselves.

"This example reminds one of the present effort of the U. S. A. under the Marshall plan and other loans to foreign countries. We are now supplying high production machine tools and know-how which no other country has, to European manufacturers, who are getting ready to compete with us in automobiles and other vital mass production lines. This gives a little temporary stimulus to our starving machine tool builders, but let's face the question—how will it work against us later? Even worse, we do not even get paid for what we furnish. Anyone I questioned abroad about repaying our loans or even interest, just laughed at me."

Use of New Pyrometer Results In Better Quality Castings

J. MANUELE

Director, quality control department, Westinghouse Electric Corp., Pittsburgh: "An immersion type pyrometer developed for measuring temperature of molten metal within the range from 2000° to 3000° F, is rapid, reliable, and convenient to use. The circuit between the two thermo-electric elements—a graphite rod and a tungsten rod—is closed by the molten metal itself, and the temperature, in degrees fahrenheit, is read directly on a specially calibrated millivolt-meter.

"This instrument has been used to advantage to study the temperature drop in molten cast iron between the cupola and the mold, especially in the casting of small, thin-section castings of 5 pounds or less. It was suspected that the temperature of the iron going into the mold was too low, but conventional instruments were too inconvenient to use for measuring the temperature of such a small stream, and observations were too erratic to be of any practical value.

"This new type pyrometer has made possible better control of the temperature of molten cast iron at the point where it enters the sand mold. This has resulted in better quality castings, especially in regard to machineability, which in turn has meant elimination of an annealing operation; and higher machining speeds."

"Get it down cold"
—efficiently
—dependably
—economically
with Vaughn
COLD DRAWING MACHINERY
VAUGHN
"Quick on the Draw!"
VAUGHN MACHINERY
PROFITABLY USED BY LEADING WIRE MILLS SINCE 1871

Vaughn Cold Drawing Machinery thrives on long, hard runs because we build tough production-ability into each and every unit. Vaughn flexibility and versatility take care of the short runs, too! For cold facts on cold drawing problems of every type, call Vaughn.

THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

Corrosion-resistant metals cut maintenance . . . No. 1 problem—boost output or else . . . Fabricators more receptive to new methods . . . Trend of progressive manufacturing disrupted . . . Competition to step up equipment development

Envisions Research Aiding Pressure Vessel Industry

FRED L. PLUMMER

Director of engineering, Hammond Iron Works, Warren, Pa.: "The Pressure Vessel Research Committee of the Welding Research Council has now completed 3 years of study to secure basic information which will make possible construction of economical vessels of assured safety under the wide range of service conditions to which such vessels are now subjected.

"The program is divided into four major divisions with the writer as chairman of the division which is attempting to determine the effect of various fabricating operations on the physical properties of the metals used. An extensive research program is being completed at Lehigh University to determine effect of large strains such as those which occur during cold forming operations on the service performance of the metal.

"Recently a committee under the chairmanship of H. C. Boardman has been formed to prepare an interpretive report which will summarize the results to date on the investigations of this division. It is hoped that this report may furnish valuable information in a condensed form suitable for use by engineers in industry and by code making officials."

The Amplistat—New Tool For Steel Industry

H. W. POOLE

Manager, steel mill division, Industrial Engineering Division, General Electric Co., Schenectady, N. Y.: "The past year has seen several practical applications of a new tool in the steel industry—the amplistat. The introduction of the amplistat into the steel mill industry, which was announced in 1948, can be compared with the revolutionary effect of the amplidyne on application practices some 10 to 12 years ago.

"This useful tool, technically known as a self-saturated magnetic amplifier, represents the latest advance in amplifiers for industrial regulating circuits. It has been used successfully to maintain automatically the level of the steel strip in a pickling tank and to hold tension on the winding reel of a tandem cold strip mill.

"On a hot strip mill now being placed in service, the amplistat will regulate the voltage and load division between two mercury-arc rectifiers which will supply power to the direct current motors driving the finishing stands."

Trend of Progressive Manufacturing Disrupted

ROBERT E. W. HARRISON

Registered professional mechanical engineer, Chambersburg, Pa.: "Of technological developments in the hot and cold forming of metals, there have been plenty during the last year. Ability of U. S. engineers to produce machinery designs capable of accurate, cheap and extremely rapid production is higher now than ever before; manufacturers these last 4 years have bought their new products with enthusiasm. The U. S. investment in more productive machinery since war's end has consumed many billions of dollars.

"Three significant facts stand out: 1. Most of the new plants have been bought out of earned surplus, not out of new stock issues. Why? The stock market cannot deliver. 2. Anticipated improvement in rate of output per man-hour hitherto accompanying the installations of more productive machinery has not been realized. In the decade 1939-1949 improvement has been less than 1 per cent per annum. 3. Wage costs per unit produced are up 88 per cent, and additional cost burdens could easily take this item up to 100 per cent over the 1939 figure.

"Before World War II, it was conceded by U. S. management and labor that higher unit output was the order of the day and U. S. labor always got its cut out of the additional profits. This was, and could still be fair to all parties, stockholders and public included. But we must face the facts. England has no monopoly on 'slow-downs'. We have one also. Traditional American common sense is in serious question. Someone expects something for nothing and this folly stems from our powerful (and imported) labor leaders, who have found out that they can trade their voting support to politicians who either from utter economic ignorance, or from a deeper and more sinister motive, are able and willing to disrupt the trend of progressive manufacturing efficiency and to try to substitute, therefore, the same status that has brought socialist countries to bankruptcy."

Fabricators To Be More Receptive to New Methods

W. C. DENISON JR.

President, Denison Engineering Co., Columbus, O.: "A real 'Activator' is my term for 1950's favorable outlook in our industry. With today's emphasis on cost-cutting, manufacturers are putting their production methods 'under the microscope' as never before—resulting in unprecedented demand for automaticity in machines as well as equipment for feeding material to those machines. Consequently, they're receptive to new methods that have promise of doing a job more efficiently.

"With production men so conditioned, coupled with the cost-cutting records that are being stacked up daily for oil-hydraulics in new and previously unthought of applications, our industry has a most unusual marketing opportunity.

"At the same time, we are now confronted with good old-fashioned competition. This means that every phase of our operation—from sales down to research—must be more 'on-the-beam' than at any time in history. And this is good because strenuous, well-disciplined application builds a stronger, more effective organization.

"So I feel that with 1950's activation we have every reason to look forward to a successful year, both volume and profit-wise—and too we have the necessary stimulant for entering the next period much stronger in organizational stature than possible during the past 'easy-order-taking' years."

We Must Adapt Our Products To Fit Foreign Requirements

S. MENTON

Manufacturing manager, General Motors Overseas Operations, Detroit: "General economic conditions throughout the world have created a favorable situation for export of American machinery, equipment, tools and know-how. Many countries have enjoyed an industrial development during the past decade which can be expected to continue, thus enabling them to satisfy domestic demands for many consumer goods which heretofore they have procured from other countries.

"American industrial machinery and equipment is generally geared to fill the demands of a large mass market under competitive conditions which do not exist elsewhere. Since market potentials in other countries for consumer goods are often small in comparison with the market in the United States, it is, in many cases, not feasible for foreign industrial enterprises to buy expensive and highly productive equipment, such as we use, for their more limited markets. A manufacturer in Brazil, for instance, needs machinery and equipment keyed to fit the requirements of his particular market.

"There is a great need for United States machinery, equipment and know-how in many foreign countries, but if we are to satisfy their needs, we must adapt our machinery to fit their requirements. While much of the machinery and equipment we produce already anticipates these needs, and much of our know-how will enable the foreign producer to improve his product, reduce his costs and thereby enlarge his market, much remains to be done. This phase of machinery and equipment export will, I believe, receive more attention in the future, particularly as the flow of American risk capital into foreign industrial enterprises increases."

Corrosion-Resistant Metals Cut Equipment Maintenance

EVERETT C. GOSNELL

Vice president, Colonial Iron Works Co., Cleveland: "During 1949 many changes were made in selection of materials and fabrication methods for the production of special corrosion-resistant processing equipment. Trend in the chemical and allied industries has definitely been toward the greater use of corrosion-resistant materials, ferrous and nonferrous, solid and clad. This includes many of the special and very expensive materials such as the Hastelloys, ELC (extra low carbon) stainless steels, particularly of the type 316 composition; 'L' nickel (low carbon nickel), etc., also great interest in future applications for titanium. The chemical industry is now giving serious thought to equipment maintenance and replacement costs, with greater demands for increased continuous production.

"Argon-shielded tungsten-arc welding method has been successfully used for fabrication of chemical equipment of stainless steels, Inconel, Hastelloys, aluminum, copper and silicon bronzes of which Everdur is a type. Some measure of success with this welding method has also been achieved with nickel, Monel and titanium. Great improvement has been made in methods of lining steel equipment with the more expensive corrosion-resistant materials by seam and plug welding, involving multiple pass procedures, reducing the effect of heat affected area to a minimum.

"Emphasis has been placed upon importance of proper selection of corrosion-resistant materials and definite specifications are now commonly made. The trend is toward higher operating temperatures and pressures for processing equipment; thus a larger portion of such equipment must be designed and fabricated to code requirements."

Flexibility of Induction Heating Emphasized

R. N. BLAKESLEE

Vice president, Ajax Electrothermic Corp., Trenton, N. J.: "Business in the induction heating and melting field continues good—probably a little better than last year and orders continue to come from healthy sources. Although government and foreign orders are normal, most of our sales are to American industry. More and more small foundries are putting in induction melting equipment because its extreme flexibility enables them to expand their lines and cut waste. Ease with which they can start up, produce a special alloy or part, and then switch to other work, more than offsets the disadvantage of first cost, even for some of the commoner alloys.

"While the forging field is slower to take advantage of induction heating, nevertheless most of the plants where it is installed are showing a profit and others are being forced to consider it in view of the extremely better working conditions afforded. One would-be user said 'I can't afford to put induction heating on that job because the minute I do my labor force will insist that I use it whenever possible in the plant.' Well, gas lights were cheaper too."

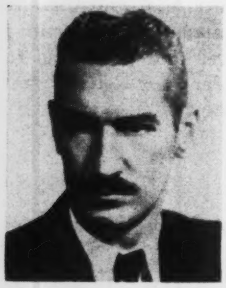
Extensive Use of Low Hydrogen Electrodes Noted

A. N. KUGLER

Welding engineer, Air Reduction Sales Co., New York: "A very significant trend may be noted in the extensive use of the low-hydrogen types of electrodes, particularly of the E6016 and E6015 classification. Originally developed for welding of hardenable steels subject to underbead cracking, these are now commonly employed on maintenance and general job shop welding.

"Reasoning behind these applications is simply that in maintenance work and in the operation of a job welding shop, they are frequently confronted with steels of unknown analysis. Welding of such steels has all too often led to difficulties with cracking because of their analysis or their inherent characteristics. By standardizing on the E6016 electrodes, they are assured of sound welds with a minimum of difficulty in cracking.

"Of course, the low-hydrogen electrodes have also demonstrated their ability on such varied work as high sulphur, free machining stock, cold rolled steels and welded assemblies for vitreous enameling. The inherent qualities of the low hydrogen type coating have naturally led to its adaptation for higher strength alloys, such as represented by the 9016 and 10016 groups."



J.I.C. Hydraulic Standards Welcomed by Industry

S. B. TAYLOR

President, Parker Appliance Co., Cleveland: "A long step forward in the hydraulic field was taken in the year just past with the application of Joint Industry Conference (J.I.C.) Hydraulic Standards to production machinery manufactured for the automotive industry. These standards were formulated after a 2-year co-operative study program involving the Automotive Joint Industry Conference, the hydraulic equipment manufacturers, the hydraulic press manufacturers, National Machine Tool Builders' Association, Resistance Welder Manufacturers' Association and the tube and fitting manufacturers group. They undertake to set a high performance standard for hydraulic equipment while effecting a simplification of maintenance. That the benefits offered by such a standardization will be welcomed by all industry is a foregone conclusion.

"In the area of circuit connection elements with which Parker is concerned, the conference standards apply the same rigorous Air Force-Navy testing sequences by which fittings qualify for aircraft service."

Higher Standards Increase Product Demand

R. G. WIDDOWS

President, Electric Controller & Mfg. Co., Cleveland: "In the industrial electrical equipment field, great strides have been made in the development of new products which feature reduced manpower for upkeep and increased safety. One of these products, permitting the servicing of a greater number of units without increase in manpower, is an alloy steel-plate resistor for motor control service. Besides bolted construction as previously used, the steel-plate grids are off-set and their mated ends are welded to maintain a continuous electrical path independent of end-clamping-nut pressure, with a consequent reduction in requirements for preventive and corrective maintenance.

"Another product is a new starter which gives unlimited short circuit protection to motors operating on 2300 to 4600 volt power systems. The new starters incorporate a volt-ampere-limiting feature. When a fault occurs, the motor circuit is not only quickly disconnected from the line, but the entire system clear back to the power source is subjected to reduced stress while the circuit is being cleared.

"Higher standards are said to result from a competitive desire for better living, greater efficiency and advanced improvements. 1950 appears to be a year of opportunity brightened by the return of keen competition."

Portable Power Tools Play Important Cost-Cutting Role

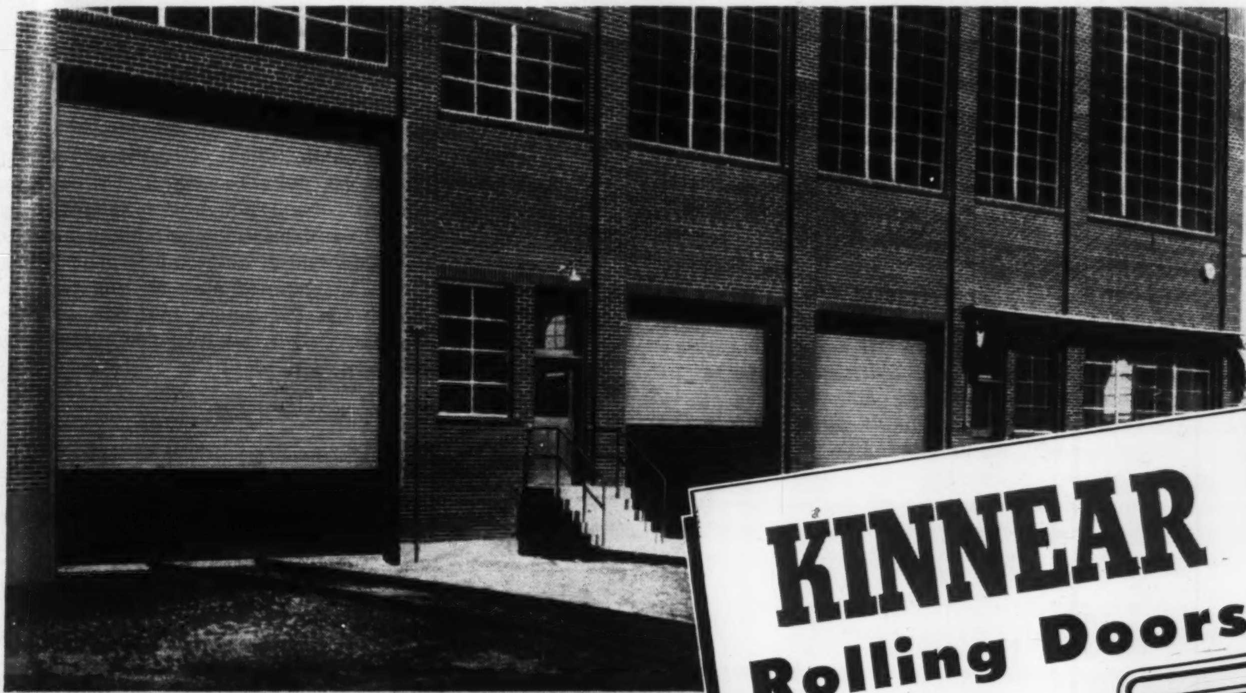
NEIL C. HURLEY JR.

Executive vice president, Independent Pneumatic Tool Co., Aurora, Ill.: "Because industry in general is investigating all possible means of cutting labor costs, there is a constant market for modern developments in products such as portable power tools. This fact was recognized early, and as a result our widely used models have been completely redesigned with the result that we have held fairly close to our own normal production and can look ahead to continued average volume as we have the opportunity to engineer more and more economical shop methods through new tool applications."

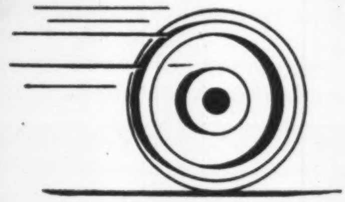
Plans for New Mills Now Include Scarfing Machines

A. J. MILLER

Development engineer, Linde Air Products Co., New York: "Nearly all larger steel mills have incorporated scarfing machines in their roll table lines for conditioning hot steel. During the past decade, such machines expanded to the extent that provision is made for them in the planning stages of new mills. Machines are in operation in which hot billets are automatically stopped and the complete scarfing cycle is controlled electroni-

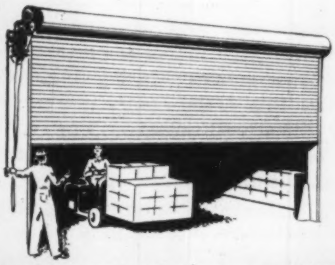


KINNEAR
Rolling Doors



...as fundamental in principle as the wheel

The smooth, rolling action of the wheel, and the coiling upward action of Kinnear Rolling Doors are *both* basic principles of highest operating efficiency. You can change the wheel's "face" in hundreds of ways, but you can't find a better way to do its job. By the same token, the basic advantages of Kinnear Rolling Doors give you the best answer to door needs. That is why these famous doors have been preferred *for more than half a century.*



SAVING WAYS IN DOORWAYS

KINNEAR
ROLLING DOORS

Kinnear Rolling Doors assure you of smooth, easy operation that saves time and effort, and keeps in-and-out traffic moving more efficiently. Their coiling upward action permits full use of all floor and wall space around openings *at all times.* Materials can be placed within an inch or two of the door curtain, inside or outside, without blocking its operation. When raised, the door clears *the entire opening*, from jamb to jamb and floor to lintel.

In addition, Kinnear Rolling Doors give you strong, all-metal construction that means lower maintenance costs *plus extra protection.* They defy the elements, resist damage by wind or vehicle, prevent intrusion, and increase fire protection.

Any Kinnear Rolling Door can be equipped for motor operation, with pushbutton switches at any number of points. The doors are built any size, for easy installation in old or new buildings. Write for full details.

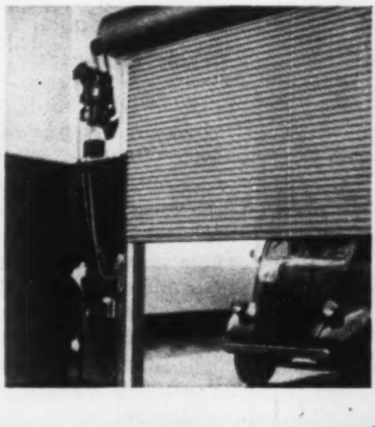
The KINNEAR Manufacturing Company

1780-1800 Fields Avenue Columbus 16, Ohio
1742 Yosemite Avenue San Francisco 24, Calif.

Offices and Agents in All Principal Cities

PUSHBUTTON CONTROL

Kinnear Motor Operated Rolling Doors are operated by pushbutton controls. Additional switch panels may be placed at any number of convenient points.



cally, including the automatic operation of gas and water valves, and other machine functions. Another new development incorporated in recent scarfing machine installations provides for automatic interruption of the scarfing operation in the event of the inadvertent stoppage of bloom travel through the machine.

"A major advance in the development of mechanized scarfing was made in 1949 with the installation in the Detroit area of the first double-sided slab-scarfing machine. This scarfs simultaneously both the top and bottom sides of hot slabs during the regular rolling process. The machine was installed to handle slabs up to 8 inches thick and 60 inches wide.

"Another type of machine developed during 1949 scarfs only the edges of hot slabs of various widths from 10 to 62 inches, and from 2½ to 8½ inches thick. It automatically compensates for changes in slab width without any adjustment, and does not require the use of motorized side guides. Oxygen and acetylene requirements for the various slab thicknesses are provided through use of semiautomatically controlled gas selector valves which obviate necessity of manual adjustment."

Machine Shape Cutting Now Universal Process

R. F. HELMKAMP

Flame-cutting specialist, Air Reduction Sales Co., New York: "Gas cutting, particularly machine gas cutting, has continued its steady growth in stature as a major industrial tool. Development of a portable, compact, but highly proficient and accurate shape-cutting machine, ideally adapted to do the work of smaller shops, and the smaller work of larger shops, represents the first opportunity for machine shape-cutting to become a truly universal process in modern industry.

"The unit is so adaptable that today, for the first time, machine shape-cutting can be carried out on the erection site of steel buildings, dams, and other structures, and in shops lacking sufficient crane facilities. Two men can carry the cutting machine to the work. Such facility has been needed for many years, and its availability promises an even wider application of the flame shape-cutting process."

Use of Variable Voltage Drives Increases

R. A. GEUDER

Manager, applied engineering dept., Reliance Electric & Engineering Co., Cleveland: "One of the most significant developments last year was the steadily increasing use of variable voltage drives for important machinery common to almost every metalworking plant. One such installation is a packaged drive for a large planer. Employing a closed loop circuit with relatively small control currents, relays, and contactors, the compact drive is designed for long life and includes many safety features.

"Further extension of the principle of all-electric, adjustable speed drives operating from alternating current circuits to drive units whose power rating is 2 hp or less has opened an entirely new field of cost cutting possibilities. Now, small drills, conveyors, inspection tables and smaller machine tools can be equipped with easily controlled power units which offer the advantages of quick starts and stops, unlimited speed selection over the full range, remote control and preset programming of machine speeds. These drive units are being installed on small toolroom lathes and semiautomatic drills, where operating speeds can be changed over a wide range to meet individual conditions. Conveyors equipped with low power variable voltage drives can now be operated at the proper speed in relation to the rest of the production lines."

Oil Well Drilling Tools Pose Tough Metallurgical Problems

DANIEL J. MARTIN

Vice president, engineering, Hughes Tool Co., Houston, Texas: "Design and manufacture of oil well drilling tools presents a unique and very difficult metallurgical problem. Due to the greater depth of oil wells and the increased weight being used in drilling, tremendous demands are being placed on design and metallurgical engineers constantly to improve the rock bits used for drilling oil wells. High compressional, tensional and impact loading operate intermittently and are dependent on the drilling technique and the formations being drilled. In addition, the product is always subjected to considerable abrasive wear and on some occasions rather severe corrosive conditions.

"Only through constant research and development work can the products keep pace with the changes and improvements in drilling techniques and the variations in rock formations which are to be drilled."

Blast Cleaning Integrated In Steel Rolling Mills

C. R. CLINE

Engineering assistant to president, American Wheelabrator & Equipment Corp., Mishawaka, Ind.: "Use of mechanical blasting equipment for cleaning and preparation of metal surfaces for tinplating, galvanizing, electroplating, cold drawing, and cold rolling at installations which formerly required the use of acid pickling has grown steadily during the past decade. A sharp upturn in this trend, particularly in integrating blast cleaning lines with steel rolling mill production lines, can now be expected because of recent developments and improvements in this field.

"Although a substantial number of blast cleaning machines are successfully operating which have either completely eliminated the need for pickling or in some instances reduced the requirements to a quick acid wash as a final step, steel rolling mills have been slow to adopt the blast cleaning process because of certain limitations the process had in the past. Most of the former difficulties have now been overcome as demonstrated by large scale experiments during the past year, both in the laboratory and at operating field installations. Based on results of these tests and experience there is promise that complete blast cleaning lines will find extensive application in steel rolling mill practice in the future.

"Improved machine design, development of longer wearing machine parts subject to abrasion, and particularly the development of steel abrasives to replace iron abrasive and the development of a wet blast machine which can be used in tandem with a dry blast machine are the elements responsible for the recent successes of this process."

New Technique Invaluable In Making Interference Fits

A. STEWART MURRAY

Assistant chief engineer, SKF Industries Inc., Philadelphia: "During 1947, I presented a paper which discussed the SKF hydraulic technique for making and breaking interference fits. Like all new ideas it has taken some time for it to be accepted and put into substantial practice. Every month we consult with companies who have conceived a new variation that when successfully developed will represent a substantial help to them and/or their customers. I have in mind an ore bridge experimental axle that I believe will be built by one of the largest steel companies, using the principle in expectation of overcoming a chronic breakage problem.

"During 1949 interested personnel in a wide variety of companies personally experienced the pleasure of successfully employing the technique for making and breaking interference fits which procedure may be varied endlessly in detail. One of these variations is made to the nut used in conjunction with tapered bore bearings. The face of the nut is modified to receive a ring that can be activated as a piston by hydraulic pressure, and tapered bore bearings can be mounted as well as dismounted with almost unbelievable ease and speed. This can be easily accomplished because the inner bearing race is first expanded hydraulically and then displaced axially—also by hydraulic pressure."

"Special" Machines with High Flexible Performance Needed

OSCAR L. BARD

President, Michigan Tool Co., Detroit: "Last year demonstrated and 1950 promises to expand a rather definite trend in new equipment preferences by industry. Spurred on by the urgent need to reduce manufacturing costs—while unwilling to tie itself down to strictly single-purpose machines—there has been a healthy development in the evolution of machines which, while 'special' in character, have a high degree of flexibility in application and convertibility.

"In the field of gear production equipment there have been a number of interesting developments along these lines. Gear finishing machines have been fitted with automatic loading and ejecting devices, further reducing their costs of operation. In some cases these devices tie in directly with other operations, thus adapting transfer machine principles while retaining the flexibility of the basic machine.

"Some gear cutting machines now available are able to keep step productionwise with gear finishers, thus facilitating a further 'transfer' tie-in.

"There has been a further extension of both these basic machine types into machine sizes capable of handling larger gears on a production-line basis. Thus their inherently low operating cost has been made available even where gears are produced in job-lots.

"The basic principles of cutting all teeth simultaneously have now been adapted to the cutting of internal gears and splines, utilizing the same equipment as for external gears, except for details in the tooling.

"All of these developments promise to be of material assistance in cutting costs all along the line. Even in gear cutting tools have there been definite cost-cutting developments. Some of these tools can now be sharpened in gangs on conventional surface grinders, greatly reducing sharpening time and cost."

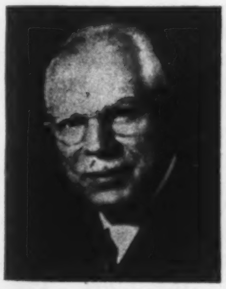
Adjustable Voltage System Adds New Speed

A. NOVARA

Cutler-Hammer Inc., Milwaukee: "Working in conjunction with tube mill equipment builders, we have achieved a new standard of speed and quality in the field of electric resistance weld tube mills by the combination of adjustable voltage and electronic control.

"The mill's tube forming and sizing sections, as well as its auxiliary drives, are controlled by an adjustable voltage system to provide mill synchronization and stepless speed adjustment.

"Electronic control regulates the welding power. On tube mills of speeds less than 100 feet per minute, alternating current shop power is modulated by an ignitron type electronic controller to provide regulated welding power. For mills above 100 feet per minute, high frequency generators up to 360 cycles provide the welding current. Output of these generators is regulated by a rapidly responsive electronic type regulator that controls excitation of the generator shunt field."



Management's No. 1 Problem—Boost Output or Else

GEORGE T. TRUNDLE JR.

President, Trundle Engineering Co., Cleveland: "Broadening of pension programs and maintenance of high wages now emphatically underscore, as never before, the sheer necessity of getting full utilization of productive equipment and allied facilities in America's factories. To get employees to realize that it has become absolutely imperative to obtain the maximum measure of output for which machines and methods in everyday productive use are expressly designed is management's toughest problem as we head into 1950.

"Today, manufacturing tools and equipment are so designed and engineered that it has become virtually a pleasure for the operator to use them. Machines replace brawn in countless instances, so great has been the technical progress recorded in recent years! Yet, despite the fact that physical effort of machine operators has been reduced substantially, it is an all-too-common experience to find output of existing equipment in score upon score of plants lagging far behind its rated production capacity.

"This very fact presents a challenge to both management and labor in 1950: If we are to continue paying high wages and underwrite pensions on a sound economic basis, we must either increase productivity or raise prices.

"It's got to be one way or the other; there's no compromising 'middle road' to follow in groping for a solution to the problem fundamentally. Limitations upon productivity simply add more fuel to the fire of inflation, with the consuming public paying the extra freight charges for the long haul through higher prices.

"Restricting output by failure to make full use of the productive capacity is, in effect 'short-changing' the customer—the public. It means that, in failing to capitalize upon maximum benefits of technical progress we have made, buyers are forced to pay more money than they should for many of the goods they purchase.

"How are we to solve this problem? That's management's responsibility—and No. 1 job—this year. We know what machines can produce; and we know, too, that they are not being fully utilized. The answer inevitably lies, it seems to me, in putting across to employees the need for maximizing productivity and their stake in its realization.

"To accomplish this two-fold objective, industrialists everywhere—from those operating the smallest shops to those directing the destinies of multimillion-dollar plants—must start now. This educational job starts in the plant itself and extends outward through community channels of communication to every segment of the general public."

Leases Unit for Generating Oxygen on Premises

F. E. PAVLIS

Technical sales director, Air Products Inc., Allentown, Pa.: "Leasing generating equipment to users of oxygen now permits them to make oxygen on their premises from atmospheric air.

"Since atmospheric air contains a significant quantity of nitrogen, an Air Products oxygen generator is capable of producing product oxygen and by-product nitrogen. Heretofore, this nitrogen has been largely wasted, but during the past year particularly, many companies have become interested in nitrogen for use as an inert atmosphere. Since this by-product nitrogen can be produced at high purity and at extreme dryness, and since it does not contain any hydrocarbons, it promises to become useful in various furnace operations and in other ways where a special atmosphere is required.

"Many tests are currently in progress or pending whereby steel producers and fabricators will be making use of this by-product nitrogen in the future. The fact that it is a by-product of oxygen generating equipment will mean that its cost will be low."

Immersion Thermocouple Plays Important Role

HARRY F. WALTHER

Superintendent of melting, Timken Roller Bearing Co., Canton, O.: "During the past year the immersion thermocouple for measuring the temperature of molten baths in both open hearths and electric furnaces has been developed to a high state of perfection. This control instrument ranks in importance with the direct reading spectrometer in producing alloy steel with desirable chemical and metallurgical characteristics.

"While carbon handling in the metal mix is very important it is a fact that accurate control of temperature while melting and finishing a heat is equally necessary for a product of best quality. Benefits obtained by using this instrument are so great that it may now be considered compulsory in producing high grade alloy steel efficiently."

New Methods Improve Coupling Performance

JOHN H. SCHMID

Vice president, American Flexible Coupling Co., Erie, Pa.: "Last year brought forth innovations to overcome ever-present problems encountered in the direct connection of equipment for mechanical power transmission. Protection of bearings from misalignment stresses with flexible couplings mounted between direct connected shafts has been greatly enhanced by the introduction of new machining methods which make available crown faced gear teeth in gear couplings. Gear couplings are now being manufactured which allow satisfactory operation under extreme misalignment conditions with positive gear engagement and a minimum of backlash heretofore impossible with ordinary spur gear tooth contours.

"Another positive advancement in this field is the development of a combination gear coupling with a bonded rubber driving sleeve; the gear coupling provides complete flexibility for shaft misalignment while the rubber absorbs all vibration. An overload safety feature prevents failure of the rubber bond under extreme overload conditions."

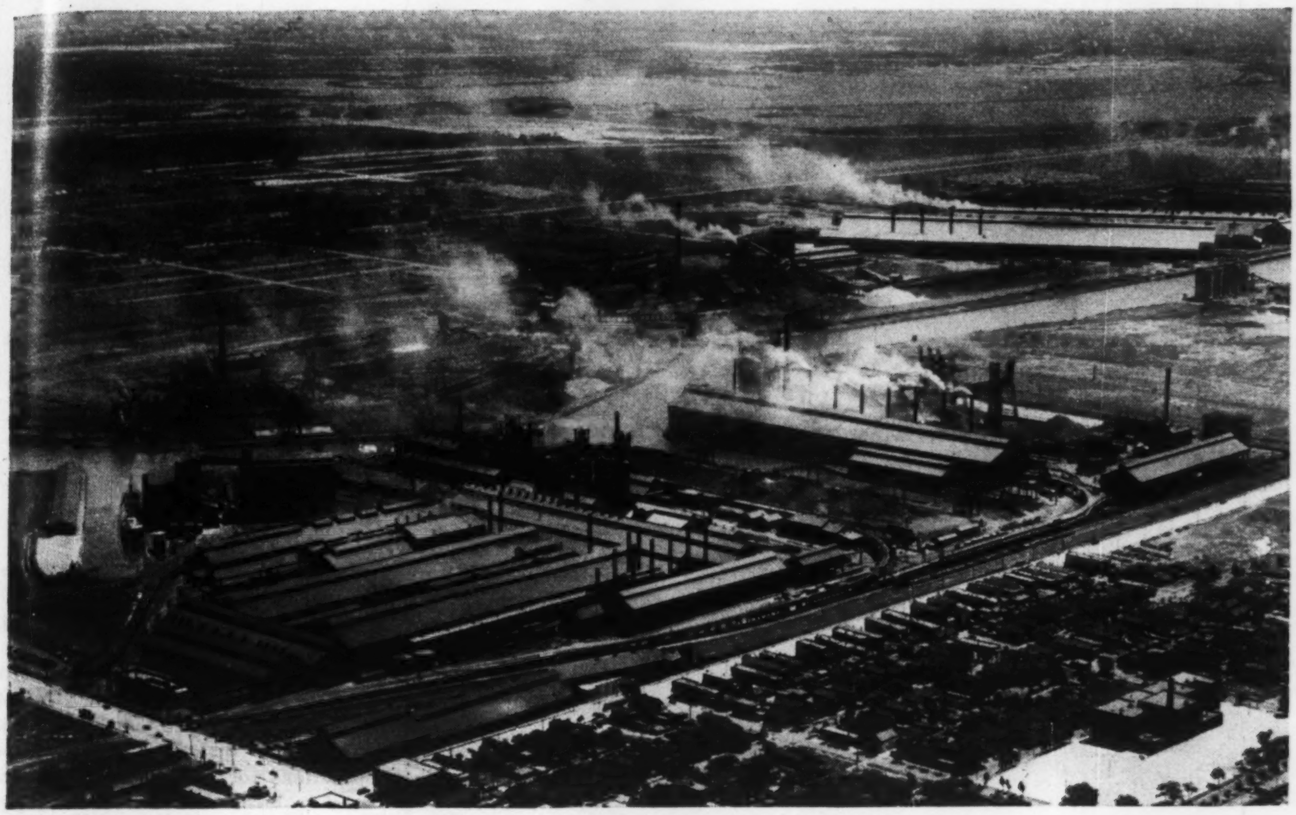
Improved Products Result From Technical Co-operation

THOMAS A. WILLSON

President, Willson Products Inc., Reading, Pa.: "As manufacturers of industrial safety equipment, such as goggles, respirators, gas masks, air analysis instruments, etc., we use a wide variety of materials, including steel, brass, rubber, plastics, glass, leather and textiles. Obviously, the quality of our products depends largely on the quality of the raw and semifinished materials furnished us by our suppliers.

"In this connection, it is gratifying to be able to comment on the splendid co-operation that we receive from them. They put at our disposal the facilities of their own research and development departments and continually bring to our attention new processes and improved products that are of value to use. In my opinion, this kind of co-operation is the very basis of American business and is the sole reason for our continued progress. Unfortunately, it does not seem to extend to our political life, the philosophy of which seems to be the direct opposite to it.

"Too much emphasis cannot be placed on the co-operation among manufacturers toward solving their mutual problems and improving their products for the benefit of the ultimate consumer."



from this Completely Integrated Plant

WISCONSIN STEEL can supply

BASIC OPEN HEARTH STEEL

- **ALLOY STEEL**
  - Bars
  - Billets
  - Blooms
  - Slabs
- **CARBON STEEL**
  - Bar Mill Products
  - Rounds and Squares
  - Flats
  - Bar Size Angles and Channels
  - Tire Sections
  - Spring Steel
  - Special Sections
- **STRIPS**
  - Hot Rolled
- **STRUCTURAL SHAPES**
  - Angles
  - Channels
  - Special Sections
- **PLATES**
  - Universal Mill
- **SEMI-FINISHED**
  - Billets
  - Blooms
  - Slabs
- **SPECIAL STEELS**
- **SULFITE-TREATED STEELS**
- **COLD FINISHED ROUNDS** Alloy and Carbon

FACILITIES FOR ANNEALING, HEAT TREATING AND MACHINE STRAIGHTENING
● **PIG IRON** ● **BASIC** ● **MALLEABLE** ● **FOUNDRY**

Contact our sales department and let us know your requirements. We are ready to give you the technical and metallurgical assistance you need to solve your problems. Remember, Wisconsin Steel means *quality*.

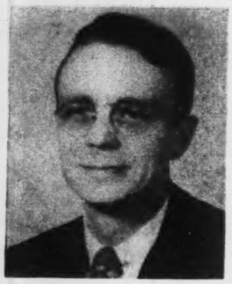
INTERNATIONAL HARVESTER

WISCONSIN STEEL COMPANY, Affiliate of
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago 1, Illinois

WISCONSIN STEEL

HEAT TREATING

Blended engineering skills improve furnace designs . . . Heat treating trend toward versatility . . . Flame hardening profitable for auto industry . . . Heat treating accuracy matches precision machining



Heat Treating Trend Toward Versatility

HOWARD E. BOYER

Chief metallurgist, American Bosch Corp., Springfield, Mass: "Complete innovations in the heat treating field involving the employment of completely new scientific principles are frequently few and far between. Changes are more often in the form of a general trend. It is obvious from a review of developments during 1949 and a quick study of equipment displayed at the National Metal Congress that the trend in heat treating is toward a higher degree of versatility. It is apparent that the demand has increased for lower volume multiple purpose equipment. This seems logical since many of the large single purpose installations were developed for wartime demands.

"This trend was observed in the various types of furnaces as well as the induction heating and flame heating equipment on display at the exposition. It was also observed that furnace manufacturers have finally given more thought to the development of extremely small equipment which, it is believed, will serve to fill a long existing need. Such equipment fills the requirements of the manufacturer who has a low volume of small but different parts, thus requiring a variety of temperature and atmosphere conditions. This small versatile equipment also plays an important role when employed for use in heat treating laboratories or for pilot installations."

Heat Treating Accuracy Matches Precision Machining

ORLO E. BROWN JR.

Chief metallurgist, Western Gear Works, Lynwood, Calif.: "Last year saw much standardizing of procedures which promoted economy in production. In the records made, it is evident that many recently adopted processing changes can save production dollars. For example, heat treating for machinability can save machining time of far greater value than the heat treating costs. Alert production men are availing themselves of preliminary heat treatments to give maximum machinability in specific operations. It is of special usefulness with parts to be broached or slotted, and where surface finish is important.

"While carbide tools have been generally accepted, it is in the machining of harder materials that they offer the greatest advantages. An increasing number of parts are being machined from heat-treated stock. Use of protective atmospheres during heat treatment of through-hardening grades has in many instances proved to be less expensive than operations for the removal of scale, or the extra setup time required for finish machining. This is another example of a more expensive operation cutting overall costs by reducing man-hours of subsequent operations.

"In the field of case hardening the increasing number of users of gas carburizing indicates more accurate control of the case. Precision of machining is being matched by improved accuracy of heat treatment."

Induction Heating Rounds Out Production Line Manufacture

FRANK W. CURTIS

Development engineer, Induction Heating Corp., Springfield, Mass.: "With broader fields of application now covered by high-frequency induction heating equipment in metalworking plants, there is a pronounced tendency to arrange installations so that parts requiring heating—such as for hardening or silver-alloy brazing—can be treated in straight-line order. In other words, they go direct from a machining operation to the induction heater and then to the next machining setup. Thus heating needs are handled within the manufacturing department instead of having to revert to the traditional centralized heat treating room. This puts the induction unit in the same category as a machine tool.

"Installation of induction heating equipment in the line eliminates the cost of transporting parts to another department, reduces surplus inventory normally needed with interdepartmental handling, and speeds up production through straight-line processing.

"In induction heating applications, conveyorized handling is more and more commonly used as a means of effecting manufacturing economies. One good example is in the brazing together of two metal parts. The induction setup is arranged so that the parts progressively are hopper fed together; placed on a conveyor-type fixture; automatically provided with a preformed silver-alloy ring; sprayed with a flux and then carried through a heating coil. The brazed assembly then is submerged in warm water to remove the flux and finally is ejected.

"Similar applications of hopper feeds and conveyors are applied to hardening. In a typical case, parts coming from a machine are automatically placed in a coil; induction heated; then spray or immersion quenched; and finally transported to the next operation. This cycle entails little more than supervision on the part of the operator.

"Induction heating units are so clean and inoffensive in operation that their installation is practical in almost any part of the shop. In-the-line installations—because of savings possible by such arrangements—are particularly attractive to management in these times when cutting of production costs is No. 1 problem."

More Efficient Radiant Tubes Cut Fuel Costs

J. L. WHITTEN

Lee Wilson Engineering Co. Inc., Cleveland: "The arrival of 1950 heralds an era for the return to real competition in design which calls for product improvement and cost reduction. We have strived to be prepared for this competitive period by: Perfecting design features and performance of high convection annealing furnaces for large diameter strip steel coils; the application of this convection system to the annealing of wire coils; development of more efficient radiant tubes with recuperation features, to cut fuel costs and speed up heat input.

"Recuperative radiant tubes have been successfully applied during late 1948 and in 1949. The 'O' type tube is in use in all types of our bell type furnaces, with current research expanding the possibilities of this design. Continued efforts are being made to apply alloy radiant tubes for higher temperature applications, and in industries beyond the usual metalworking fields."

New Billet Furnaces Widen Concepts of Metal Heating

E. G. deCORIOLIS

Director of research, Surface Combustion Corp., Toledo, O.: "Gas-fired high speed billet heating furnaces are receiving considerable attention from the forging industry. Employing extremely high wall temperatures in the region of 2600° F, these furnaces have provided new concepts of metal heating, as well as forging production. Production rates on overall heated work on the order of 12,000 pounds per hour are possible.

"Overheating and scaling of billets during press delays are now reduced to negligible proportions through the use of a controlled atmosphere system. When the press operator touches the required pushbutton, the flow of air and fuel to the furnace is shut off; dampers close the furnace flues and protective atmosphere gas flows into the furnace. Excessive scaling of billets is thus reduced to a minimum. This, in turn, reduces scrap losses since the first billets discharged from the furnace after the holding period are completely satisfactory for forging. To return to production, it is only necessary for the press operator to touch a second button which reverses the cycle.

"Marquenching direct from the carburizing furnace, a heat treating process in which the carburized work is quenched in oil or salt at about 400° F, is an important new heat treating procedure. Marquenching has been shown to produce considerably improved service life in parts such as automotive gears. Marquenched gears show increased wear resistance, reduced distortion and toughened bond between the case and core when compared to carburized gears quenched out in cool oil. Careful control of the time in the hot salt or oil is mandatory but the improved service characteristics of the gears more than justify the extra care required.

"Use of gas-burning, integrally-fired tubes for immersion heating of salt pots is now extended from 1350 to 1650° F, while maintaining reasonable tube life, even in neutral salts. This increased temperature range, based on improved designs and methods of alloy fabrication, broadens the use of this gas heating system into the hardening field."

Heat Processing of Metals May Be Boon to Industry

FREDERIC O. HESS

President, Selas Corp. of America, Philadelphia: "Operational and test data on the hot working of metals, accumulated and scrutinized during recent years, will show their first major impact during 1950. Considerably higher physical properties can be obtained by heat processing than has been considered possible, and also that in some instances entirely different properties result—practically a new material of desirable qualities. These effects have been noted and obtained by accelerated heating and co-ordination of rapid heating rate with hot working or heat treatment—the Gradiation process. Process installations are being made taking advantage of these findings.

"In the forging industry less power is required to obtain better metal flow and cleaner almost scale-free forgings. In the steel mill greater flexibility, less scale and less power will improve production of seamless tubes or bars or sheets. And in the sheet mill, strip steel continuously annealed at high speed will change production method as well as the product because steel so annealed has different physical properties."

Electric Furnaces Used in Variety of Applications

R. M. CHERRY

Industrial Heating Division, General Electric Co., Schenectady, N. Y.: "Additional electric furnaces were placed in operation this year for the continuous annealing and dry pickling of steel strip prior to galvanizing. These furnaces have been of the tower type for the lighter gages and where floor space is of major importance, and of the horizontal type for the heavier gages. The improved quality of galvanizing obtained indicates continued activity in this process.

"Use of the continuous conveyor electric furnace for aluminum brazing has contributed materially to the production of such items as evaporators for home freezers and two-temperature refrigerators. These furnaces are equipped with Reactrol control which provides the ultimate in temperature uniformity as required for this aluminum brazing process. Largest electric furnace of the continuous counterflow heat-sealed type was recently placed in operation. The furnace is used for firing porcelain enamel on steel kitchen sinks, bath tubs, etc.

"Induction heating continues to point the way to many savings in production costs for such applications as selective hardening, soldering, brazing, tin reflowing, annealing and forging."

Salt Bath Heat Treating Makes Great Strides

WILLIAM ADAM JR.

Vice President, Ajax Electric Co. Inc., Philadelphia: "While each type of heat treating equipment—salt bath, controlled atmosphere, induction, etc.—has a clearly defined field of application, they nevertheless overlap and compete strenuously for many heating processes. This has brought about a degree of confusion. The purchaser of furnace equipment should bear in mind that the perfect heat treatment device has yet to make its appearance and most likely never will. Therefore, his choice of furnace type should await the painstaking effort of marshalling the respective performance features of competitive heating processes and determining their relative importance for job at hand.

"While the salt bath has kept pace with other furnace types for the conventional heat treating processes such as carburizing, neutral hardening and drawing of carbon, alloy and high speed steels, annealing wire in coils and the solution heat treatment of nonferrous metals, it has made great strides in the past year in other heating processes. These include austempering, martempering, cyclic annealing and other interrupted quenching operations. Also included is brazing, heating for forging and certain cleaning operations such as molds used in rubber processing, removing grease and compounds from steel stampings as well as paint stripping.

"More and more manufacturers are using mechanized salt baths not only to obtain more production per man hour but also to eliminate the human element and thereby place heat treating on the same machine-like performance basis as other manufacturing processes."

Blended Engineering Skills Improve Furnace Designs

W. H. HOLCROFT

Executive vice president, Holcroft & Co., Detroit: "Last year saw steady progress in both mechanical and metallurgical developments in industrial heat treat furnaces. Effective industrial furnace design requires a blending of many fields of engineering, such as mechanical, structural, electrical, hydraulic, metallurgical and production engineering. Where furnaces are individually designed to meet definite job specifications, this combining of engineering skills must be of a very high order; and it is helped tremendously by the many years of practice that goes with being a successful furnace builder.

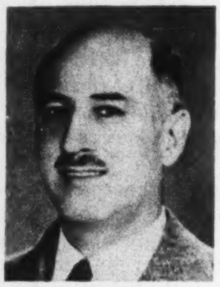
"Specific results of this blending of skills are seen in the following recent advancements: 1. Development of a process for carbonitriding steel parts at 1500-1650° F, then cooling work below the critical temperature of the core before quenching, thereby hardening the surface of the work while obtaining a core structure which is annealed.

2. "Development of a high-temperature gas generator for making furnace atmosphere gas of an endothermic base corresponding to American Gas Association No. 302. A ceramic retort is used, with operating temperatures of 2200-2300° F, permitting much higher production per cubic foot of reaction space.

3. "Development of a built-in gas generator for furnaces, for use where the purchaser's requirements do not warrant buying a separate generator. To get sufficient volume of generator gas and still operate at normal furnace temperatures, a new process of producing the gas was introduced.

4. "Development of completely automatic all-purpose batch-type gas atmosphere furnaces for carbo-nitriding deep case carburizing, and hardening or annealing without scale or decarburization.

5. "Development of high-temperature-head forging furnaces using a special refractory lining and eliminating the use of a large number of small burners."



Flame Hardening Profitable "Tool" for Auto Industry

H. V. INSKEEP

Development engineer, Linde Air Products Co., New York: "Wider distribution and use of machines for production flame-hardening occurred in last year. Much of this expansion was found in the automotive field where high production counts. Gears, splines, clutch parts, and cam shafts are some of the items being treated. Some items not hardened before are being hardened in vital areas to give it greater resistance to wear.

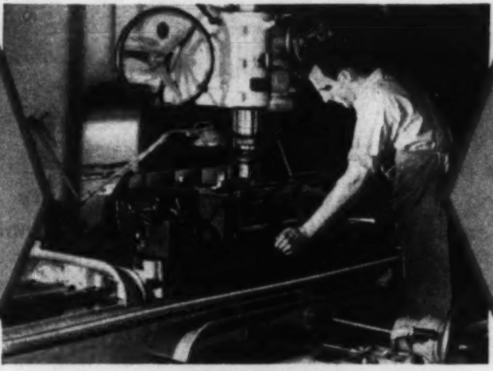
"A flame-hardening machine, designed to harden parts which are components of heavy machinery, is being used to an increasing extent. Very large gears, grooved pulleys, shafts, and rolls are regularly being treated. An interesting application is the hardening of pattern rolls. These are used to roll rubber and other materials into embossed forms. Flame-hardening the patterned roll surface by means of the progressive-spin method greatly increases the service life of these expensive items. It also produces a hard case on the roll surface without damaging the sharp projections of a complicated pattern.

"Preparation of steel surfaces before applying paint, as well as paint quality, are receiving an increasing amount of attention. By flame-priming, the oxyacetylene flames dehydrate the steel surface and warm the steel immediately before the application of the priming coat. Loose scale is popped off by the intense heat. The dehydrated surface has no adsorbed moisture or water in combined form in residual rust to continue the rusting action underneath the paint coat. The warm steel provides heat which causes paint to spread more evenly and adhere more strongly, and mild baking action on the paint coat makes it more durable. Inherent advantage of this process is the lowering of maintenance costs. Periods between repainting of structures are greatly increased."

FOR TODAY'S ALL-IMPORTANT NEED:

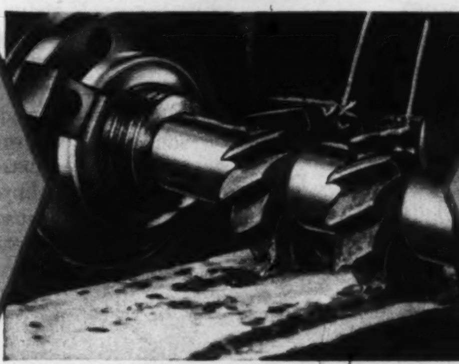
Productivity with Economy

Pratt & Whitney
PRECISION MACHINE TOOLS



JIG BORERS — JIG GRINDERS — DIE SINKERS — KELLER MACHINES — AUTOMATIC DUPLICATING MACHINES — TOOLROOM LATHES — BENCH LATHES — BENCH MILLERS — AUTOMATIC LATHES — AUTOMATIC CENTERING MACHINES — THREAD MILLERS — VERTICAL MILLERS AND PROFILERS — VERTICAL SHAPERS — VERTICAL SURFACE GRINDERS—GEAR GRINDERS — CUTTER GRINDERS — KELLERFLEX FLEXIBLE SHAFT MACHINES — DIAFORM WHEEL FORMING ATTACHMENTS

Pratt & Whitney
PRECISION CUTTING TOOLS



TAPS — REAMERS — MILLING CUTTERS — END MILLS — CARBIDE CUTTING TOOLS — FORMED CUTTERS — INSERTED BLADE MILLING CUTTERS — DRILLS — DIES — SCREW PLATES — THREADING TOOLS — BLUE HELIX REAMERS — DIE SINKING CUTTERS — DUOCONE DIES — KELLER CUTTERS AND TRACERS — CARBIDE BURS AND DI-BURS

Pratt & Whitney
PRECISION GAGING TOOLS

HOKE AND U. S. A. GAGE BLOCKS — TOOLMAKERS FLATS — CYLINDRICAL PLUG AND RING GAGES — THREAD PLUG AND RING GAGES — ROLL THREAD SNAP GAGES — ADJUSTABLE LIMIT SNAP GAGES — MEASURING MACHINES — SUPERMICROMETERS — ELECTROLIMIT COMPARATORS — AIR-O-LIMIT COMPARATORS — ELECTROMECHANICAL LEAD TESTERS — MULTIPLE ELECTRIC CONTACT GAGES — MILL GAGES

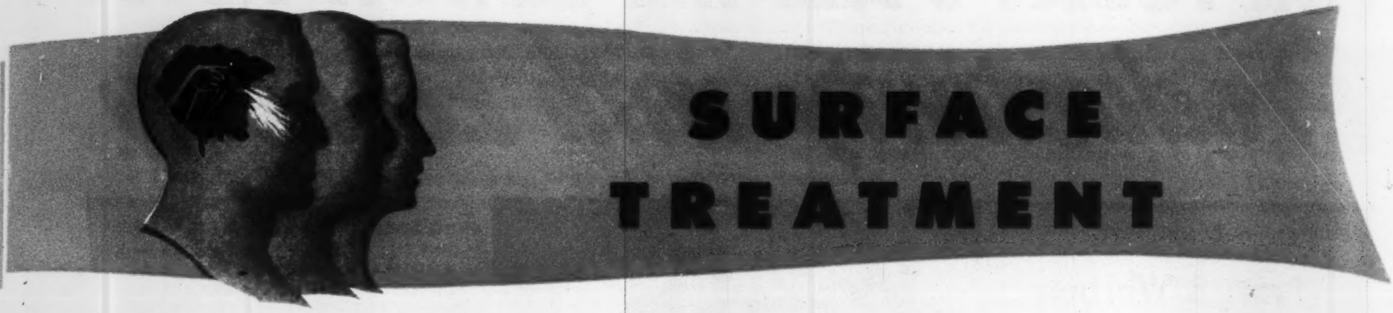
Here are the *right* Tools for competitive 1950. Every Machine, Gage and Cutting Tool listed on this page is designed and built to famed P&W standards of precision, workmanship and performance — to turn out better work, and more of it at lowest cost per unit.

Pratt & Whitney

Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

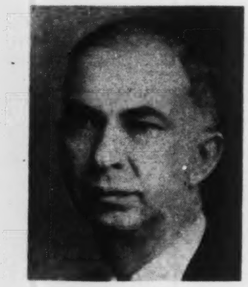
P&W

"There's no better paying investment than the Right Tools for the Job"



SURFACE TREATMENT

Sheets now galvanized continuously . . . Chemical coating facilitates drawing of stainless tubing . . . Popularity of titanium enamels increases . . . New developments to tumble finishing costs



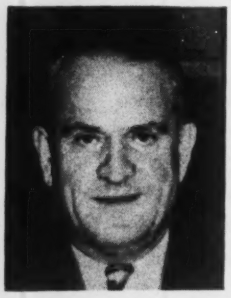
Predicts Infrared Oven Expansion Program

R. J. CARTER

President, Fostoria Pressed Steel Corp., Fostoria, O.: "The Infrared process is only 10 years old; at least from the standpoint of being used practically in industry. During that 10 year period its growth and usefulness in industry has been almost spectacular.

"Worthy of note is the fact that the first large-scale infrared oven was installed by Ford Motor Co. for baking prime finishes on automotive bodies. Chevrolet, Studebaker, Oldsmobile, Nash, White, Kaiser-Frazer and others have advanced to the stage where finish coats as well as prime coats are being baked in infrared ovens. It appears that most of the major car manufacturers, as well as their auxiliary suppliers, will proceed in 1950 to go forward on long range infrared oven expansion programs. In passing over this subject quickly it might be noted that in the Studebaker plant at Hamilton, Ontario, car bodies are being dried or baked at all stages of finishing —after bonderizing, prime coats and finish coats.

"Other possibilities for infrared in the metalworking industry are: Degreasing, soldering, predrying of porcelain enamel before firing, and miscellaneous preheating operations."



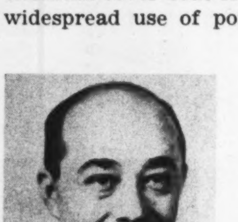
New Porcelain Enamel Frits Reduce Material Costs

E. HOGENSON

Executive vice president, Chicago Vitreous Enamel Product Co., Cicero, Ill.: "Trend of the porcelain enamel industry has been directed toward reduced firing temperature and reduced thickness. Reduced firing temperature contributes toward less warpage of the steel and provides other production advantages. Reduced thickness provides a porcelain enamel coating of greater strength—for the lighter the weight of application, the greater resistance there is to damage.

"During the past year, great strides in research have made possible the lowering of firing temperatures. New frits have been marketed and adopted by manufacturers of porcelain enamel products because of the advantages their lower firing temperatures provide. In the architectural field, the 1300° F enamels which we introduced to industry about 2 years ago have firmly established themselves as particularly desirable for that purpose.

"With further respect to thickness or weight of application, it may be said that the past year has seen the amount of frit required to produce a stove, for example, reduced by approximately 25 per cent. This has led to better products and reduced material costs. In addition, other improvements, such as those made to titanium cover coat frits, have contributed toward a more widespread use of porcelain enamel."



Continuous Strip Annealing To Aid Tin Plate Producers

A. E. KADELL

Manager, tin plate department, Weirton Steel Co., Weirton, W. Va.: "Constantly increasing attention is being directed by the tin plate industry towards better surface preparation of steel before tin coating, particularly that done by the electrolytic process. The aim is to increase resistance of tin plate containers to corrosion by both atmosphere and can contents. The rapidly expanding use of electrolytic tin plate, and the prospect of application of heavier coatings in the very near future by this process are the principal directing forces behind all the work being done along this line.

"Research and investigation over the past three or four years have influenced many in the industry to believe that annealing atmosphere and practice enter into the problem to a large extent. Annealing atmosphere in particular has been the subject of considerable study and experiment.

"Continuous strip annealing, combined with cleaning, has stimulated much thought and discussion recently in the tin plate industry on two accounts. First, there is the possibility of obtaining operational and economic advantages over existing batch-type annealing methods. This could probably be realized only with the high rates of production, which means relatively high operating speeds. Second, there is the possibility that the tin plate made from steel annealed by such a process may show greater resistance to corrosion.

"Construction of this type unit is now nearing completion in the plant of a tin plate producer in the Chicago area. The entire industry is awaiting with keen interest the results that will be obtained from this equipment. It may presage a radical change in both tin mill annealing practice and methods."

New Steel Enameling Sheet Eliminates Ground Coat

G. H. McINTYRE

Vice president, director of research, Ferro Enamel Corp., Cleveland: "Broad objective of the porcelain enamel industry over the years has been better quality ware at lower cost. Pursuit of the objective has fostered the close co-operation of suppliers of steel, porcelain enamel frit, and those engaged in the manufacture of enameled ware.

"Steel suppliers have endeavored to produce an enameling sheet which will assure the enameler of consistently high quality ware. More recently their efforts have been directed toward producing a sheet which can be coated directly with a finish enamel thereby eliminating the need for a ground coat. This is a significant contribution in view of the recognized fact that reduction in total thickness of enamel coating has been one of the major factors in increasing the quality of porcelain enameled ware.

"Frit suppliers have contributed much toward the objective by the development of titanium-bearing enamels characterized by high coverage, acid resistance, high gloss and extreme surface hardness. Current operating practices with this type of enamel applied over a ground coat produce a total coating thickness of 6 to 7 mils as compared with coatings in excess of 10 mils a few years ago. Direct application of the finish coat, without a ground coat, although still in the experimental stage commercially, has reduced thickness to 3 to 4 mils.

"The enameling plant is the apex of the co-operative triangle since only through successful manufacture and presentation of ware to the consuming public can the fruits of the combined efforts be realized. Establishment of rigorous plant practices and control procedures covering all phases of the enameling operations is of immeasurable value in increasing ware quality. Trend toward installation of automatic mechanized equipment continues."

Surface Preparation Key To Finishing Progress

C. B. F. YOUNG

Executive vice president, National Southern Products Corp., New York: "In the field of metal finishing, progress is being made again in the preparation of the metal or alloy surface and then in the deposition of certain types of bright metals upon that surface. More and more attention is being paid to automatic buffing and the products used, such as type of buffing wheels, ventilation, water soluble buffing compounds, emulsion, buffing compositions which are sprayed on the wheels, and bright metal deposition.

"Return of competition to the varied metal products manufactured has again put emphasis upon finish. Thus, bright surfaces are desired. In order to get this some plants are giving a fair cutting down job, then cleaning, and then depositing with a bright metal alloy, such as bright nickel. This can be the final finish or the nickel can be deposited along with gold alloys, chromium, or left as is.

A drive is on to up-grade quality and lower cost. To do this the metal finishers must reduce buffing costs and failures at the same time and then give a bright deposit with a minimum amount of work. These seeming impossibilities are being surmounted by manufacturers by using the latest techniques in buffing, cleaning and plating."

Demand Seen for Improved Galvanizing Practice

WALLACE G. IMHOFF

President, Wallace G. Imhoff Co., Los Angeles: "Growing importance of installing 30 or 40 gallon hot water tank heaters in modern homes has been emphasized by the failure of one 20 gallon tank in 11 months, and another in a little over 3 years. Twenty gallon tanks do not seem large enough to serve the modern home where most people require large amounts of water for bathing purposes, in addition to washing and other household uses. Premature failure of these small 20 gallon tanks is rapidly driving home owners to replace their small galvanized tanks with only one year guarantee, by glass-lined, or vitreous enameled heater tanks with a guarantee of 10 years service.

"Buyers are also demanding a more substantial base metal for garbage cans, as illustrated by one failure of a can with an extremely thin gage base metal. Failure occured in such a short time that the owner went to his service station and got a large heavy grease can to replace his galvanized garbage can which he felt did not give him satisfactory service.

"The above examples seem to show very clearly the fact that in a buyer's market, galvanizing will have to improve considerably, or face the alternative of losing markets."

Industrial Finishes Provide Eye-Appeal

B. F. AMES

Maas & Waldstein Co., Newark, N. J.: "Since 1946, users of lacquers, enamels and synthetic coatings have become more and more cognizant of the degree with which competition was growing and the need for improved products became increasingly apparent. Manufacturers of industrial finishes played an important role in providing industry 'tools' with which to sell more goods by providing the 'package' that ultimate consumers wanted to buy.

"Design engineers, industrial designers and stylists were more prone to utilize finishes that produced a hammered-effect and finishes that produced the hammered-effect with one spray coat application. Wrinkle enamels are still considered standard durable finishes and are used with colorful lacquer enamel topcoats to produce unusual effects and increase the 'eye-appeal'.

"Perhaps one of the newest contributions manufacturers of industrial finishes made to industry was flash-baking finishes. With competition growing increasingly keen and manufacturers desiring to increase their productivity a demand arose for organic coatings, of the synthetic group, that could be thoroughly baked in a matter of seconds. Thus evolved flash curing synthetic finishes that could be baked for as little as 30 seconds under certain conditions.

"Not only are manufacturers of organic coatings charged with the responsibility of producing superior quality finishes, but they are also called upon by manufacturers of products varying from diaper pins to caskets to suggest color combinations and patterns which would lend themselves to a given product and thereby afford it greater sales value.

"In full light of last fall's reign of strikes we can't help but feel that we will have a full measure of prosperity until at least the third-quarter of 1950. Conditions beyond that point are far too uncertain to attempt a prediction at this time."

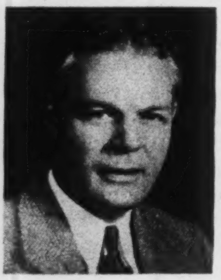
Aluminum Wire Industry Makes Great Strides

HENRY C. BOYNTON

Consulting metallurgist, Research Institute, Temple University, Philadelphia: "For wire, business was bad during the first quarter of 1949, but some pickup has been shown in the latter half, in spite of the strikes. In January, there were heavy shortages in wire nails, bale ties and fencing; now these items have caught up and the demand satisfied. In steel, there has been an ever-increasing call for stainless; many improvements in processing may be noted, such as (1) high speed, continuous, electrolytic cleaning and polishing for strip; (2) the wire drawing of round wire without lead or other metallic coating, a messy, wasteful process.

"Spurred on by competition, manufacturers of aluminum wire have been making great strides and have been giving the copper and stainless people some thoughtful moments, for aluminum—properly alloyed—is in most localities just about as permanent in its corrosion resistance as either copper or stainless and it costs less in some installations. Moreover, the aluminum people recently developed a 'baked on' aluminum enamel which is harder and more abrasive than zinc or cadmium coating and this process may possibly supplant the latter as it is cheaper.

"In the copper, brass, and bronze field, a number of new wire mills, two or more of large size, have been built and designed to handle large quantities (in miles) of the smaller sizes of copper and other nonferrous copper alloys; more and more miles of this 'fine' wire are needed to supply the radio, television and other associated electrical industries."



Chemical Coating Facilitates Drawing of Stainless Tubing

V. M. DARSEY

President, Parker Rust Proof Co., Detroit: "Several stainless steel tube companies are now in commercial production utilizing Bonderite as an aid in drawing seamless tubing. This coating produced on stainless steel serves a similar purpose as the coating used commercially for several years on mild carbon steel tubing to facilitate drawing. The chemical coating absorbs lubricant and affords a physical barrier between the surface and the die in the drawing operation.

"Use of the drawing aid on stainless steel not only makes it possible to speed up tube drawing; it further reduces rejects and minimizes scratches and other defects in the metal surface. Although this development has been utilized commercially for the second year, there appears to be a wide use and application for such a coating and lubricant to facilitate drawing stainless steel metal."

Sheets Now Are Galvanized By Continuous Process

T. F. OLT

Director, research laboratories, Armco Steel Corp., Middletown, O.: "Probably one of the outstanding developments in the field of flat-rolled sheets during 1949 has been the trend toward the manufacture of galvanized sheets by using continuous coating processes. The Sendzimir coating process is available for licensing to the galvanized sheet producers in the steel industry.

"Galvanized sheets produced by this process are unique in that the ductility of the coating is fully the equal of the base material, and as a consequence, no flaking or peeling is encountered when fabricating this type of material. This fact now allows the use of this material with a heavy zinc coating in numerous severe fabricating operations involving drawing, spinning, roll forming, and bending. Products involving severe fabrication heretofore have been either fabricated from materials having thinner zinc coating with lesser corrosion resistance, or have been hot-dip coated after fabrication, involving higher cost."

Popularity of Titanium Enamels Gradually Increasing

W. A. DERINGER

Director, ceramic research and development, A. O. Smith Corp., Milwaukee: "The past year has seen the titanium-type of cover coat enamel become more generally adopted in industry at the expense of other types of cover coat frits—particularly those of the zirconium type. This acceptance has no doubt been in a measure due to overcoming one of the greatest objections to titanium enamels, i.e., by improving the color stability of this frit. Titanium enamels are becoming increasingly popular because of their good reflectance, good abrasion resistance and excellent acid resistance.

"Low temperature enamels—firing at 1350 to 1450° F—have not proved to be as beneficial as was anticipated because of the longer firing time (slower chain speeds) required and consequent reduction in production."

Galvanizers Review Coating Specifications

FRED C. BRIGHTLY JR.

Vice president, Standard Galvanizing Co., Chicago: "Under the auspices of the American Hot Dip Galvanizers Association Inc., many new developments in the field of hot-dip galvanizing have been carefully screened and considerable research has been made by committees of this association.

"The committee making the study of hot-dip galvanized coatings as applied to range boilers, hot-water heaters and storage tanks has been greatly aided

EXIDE-IRONCLAD PLATES are DIFFERENT

EXCLUSIVE Positive Plate showing slotted tube construction.

Enlarged cutaway view of section of tube containing active material. So small are the slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose.

The famous and exclusive Exide-Ironclad positive plate is the result of sixty-two years of battery-building experience. During that time we have learned much about the design and construction of every type of battery for every application. Development work never ceases in improving the performance of Exide-Ironclad Batteries. Our research staff is the largest in the industry. Engineers, chemists, metallurgists, physicists, technicians and their aides, equipped with all the necessary tools and devices, are constantly building and testing various types and kinds of plates and assemblies.

We have yet to find a positive plate with all the desirable characteristics of the Exide-Ironclad for use in battery electric industrial trucks. Further proof of its superiority is supplied by long service records in thousands upon thousands of installations.

Exide-Ironclad Batteries provide high power ability, high electrical efficiency, ruggedness, long life, minimum maintenance. The combination of these Exide-Ironclad characteristics assures years of dependable day-in, day-out service . . . *at lowest cost.*

Exide
IRONCLAD

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

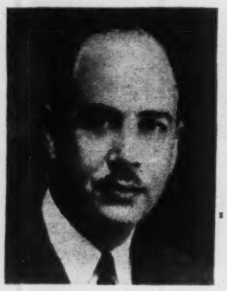
1888 . . . DEPENDABLE BATTERIES FOR 62 YEARS . . . 1950

"Exide-Ironclad" *Reg. Trade-mark U.S. Pat. Off.*

by the use of x-rays of galvanized coatings through the cooperation of General Electric X-Ray Corp. and has developed much valuable data pertaining to galvanizing from this x-ray analysis of coatings. A stepped-up continuation of this work is expected during the years 1950 and 1951.

"The specifications committee of the association has been working to revise the specifications for hot-dip galvanized coatings to more clearly and practicably align the specifications with current practices. This has been done largely at the request of manufacturers and others who realize that existing specifications on galvanizing are in dire need of revision. The Navy and several other governmental agencies have already revised their galvanizing specifications in line with those of the association.

"A new field for the use of hot-dip galvanizing has also been developed during the year 1949 which for the first time has found the use of hot-dip galvanizing as a source of rust protection measuring up to its usual high standard of endurance on exhaust equipment for trucks, buses and passenger cars. This promises to be one of the most important new fields for the use of hot-dip galvanizing. A complete line of truck and bus mufflers is now being manufactured by Galvanized Motor Mufflers Inc.; all products of that company are hot-dip galvanized after fabrication."



New Developments To Tumble Metal Finishing Costs

MYRON B. DIGGIN

Technical director, Hanson-Van Winkle-Munning Co., Matawan, N. J.: "Several developments have come into a prominent position in the metal finishing field within the past year. Use of abrasive belt polishing to supplement and, in many cases, to supplant abrasive base polishing wheels, has made substantial gains. With development of special contact wheels, belts can be operated at much higher speeds—12,000 to 14,000 fpm not being uncommon in foundry roughing and polishing operations. The elimination of hand facing, rapid changing features and greater production per belt has reduced polishing costs to as low as 30 per cent of conventional wheel polishing methods.

"Use of liquid buffing and coloring compositions by spray application has expanded, although some limitations in the range of application still exists, indicating the need for continuing study.

"An outstanding development is the marketing of water dispersible buffing compounds for cutting down and coloring a wide variety of metals. Today's water dispersible compounds have rapid cut, produce good color and, being dispersible in an aqueous medium, greatly lessen the cleaning problem in alkaline cleaners prior to lacquering or plating operations.

"Two methods for producing smooth and bright surfaces on metals have come into a greater use. Electropolishing is being used to level and brighten not only basic metals but also electrodeposited coatings, thus saving polishing or buffing costs. Chemical polishing, a simple dipping procedure, is being used on aluminum, nickel-silver, monel and brass. Although the finish produced is bright, it is not equivalent in appearance to a buffed surface.

"Three metal deposition processes that are entirely different from usual electrodeposition methods have come to the public attention, with two of the processes being used to some extent on a commercial basis. Since the announcement of the Bureau of Standards a few years ago that it was practical to deposit metals by chemical reduction, termed 'electroless plating,' some commercial applications have been found for this process, particularly for nickel deposition. In most cases, dull or semibright deposits are satisfactory, but bright deposits have been obtained. This method is particularly suited for application of nickel to articles having deep recesses.

"Another process in the pilot plant stage is known as 'gas plating'. It takes advantage of the decomposition of metallic compounds, generally carbonyls, in a carrier gas at a definite temperature to produce metallic films such as are obtained by electroplating and other means. Concentration of metal compound in the carrier gas, rate of flow to plating atmosphere and temperature of the objects to be plated are controlled to yield deposits with the required density, ductility and thickness. Speed of deposition is also controllable.

"Turning to conventional electroplating methods, a new high speed chromium plating solution is claimed to reduce operating costs considerably in comparison with conventional chromium plating baths. Reduction in costs is attributed to a 50 per cent higher cathode efficiency. These higher efficiencies and the fact higher current densities can be used without burning, enables this solution to plate at much higher speeds.

"Use of periodic reverse current in electroplating operations also expanded last year. New equipment, new addition agents and suitable solution compositions were developed and applied so that now a complete process for copper plating under optimum conditions with the PR current is available. The use of an inorganic addition agent is a novel part of this process. While PR current was applied to many cyanide-type plating solutions, it has not been used to an appreciable extent with acid type electrolytes.

"Lifting of tin restrictions in the early part of last summer led to greater use of hot tin coatings on such articles as refrigerator shelves etc. Electrotin plating also increased. A bright alloy deposit of copper-tin-zinc, used for many war purposes but not available for general use, has benefitted by the availability of tin. This alloy plating process is now in general use on a wide variety of products. The deposits are a pleasing white color, have excellent tarnish resistance and are highly protective when applied to copper-base alloys."

Better Quality, Lower Cost Demanded of Finishes

RICHARD O. LOENGARD

President, United Chromium Inc., New York: "Our greatest interest of course, lies in the field of protective finishes, both in the electroplating field and in the organic coating field. Problems here are not unique. As is so generally true, the great demand is for processes and materials which will combine improved quality with lower cost, and the trend of technological development continues to have this goal constantly in mind.

"The coming year and future years will send the press of developments along these lines, and we in United Chromium hope to do our share in bringing about this worthwhile achievement to the desired end."

How TIMKEN® bearings help 8-spindle Mult-Au-Matic give accurate, chatter-free operation

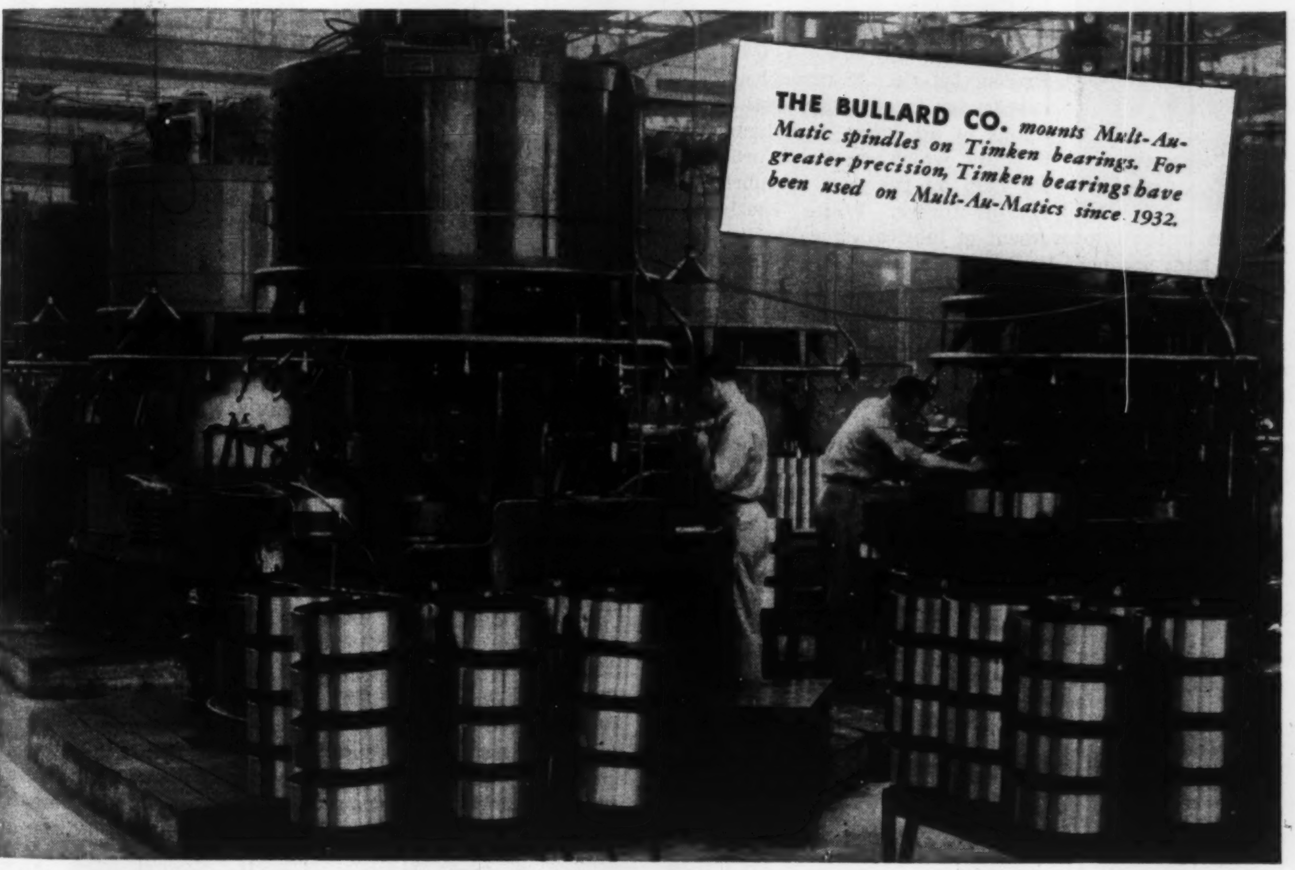
IN the Bullard Mult-Au-Matics below, production moves in a continuous merry-go-round, as eight spindles carry the work pieces successively through a wide range of operations performed by the tool-carrying heads. Precision operation depends on perfect co-ordination and extreme accuracy of all working parts. That's why Bullard mounts all eight spindles on Timken® tapered roller bearings.

Timken bearings, pre-loaded for maximum precision, hold each spindle accurately positioned and in rigid alignment. High thrust loads due to vertical mounting are no problem, since Timken tapered construction carries both thrust and radial loads in any combination. The line contact between the rolls and races of Timken bearings gives the spindles maximum support, with no chance of deflection.

Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel. They're manufactured to incredible precision, finished to amazing smoothness. Make sure that the trade-mark "Timken" is on the bearings of all the machines you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



THE BULLARD CO. *mounts Mult-Au-Matic spindles on Timken bearings. For greater precision, Timken bearings have been used on Mult-Au-Matics since 1932.*

NEW TIMKEN BEARING CUTS RUN-OUT IN HALF!

Until now, the Timken "Zero" bearing has been the last word in bearing accuracy. Now Timken offers industry the "Double-Zero" bearing—*twice as accurate* as the "Zero"! Maximum run-out of the new "Double-Zero" bearing is only 75 millionths of an inch—*half* the 150 millionths run-out of the "Zero" bearing.

What an opportunity for manufacturers of machines where extreme accuracy is essential! Available in standard single row types, up to 10" O.D. Write for further information.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

LUBRICATION

New fluids to expand use of friction drives . . . Bearing makers study lubrication . . . All-purpose greases in great demand . . . Good lubrication practice vital to efficient production . . . Importance of clean oil recognized

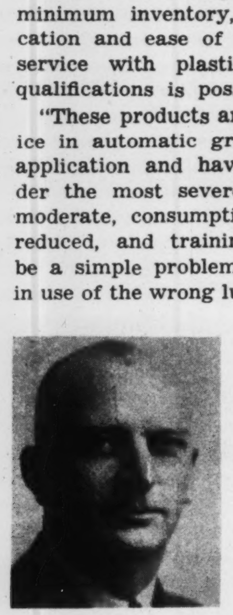
All-Purpose Greases In Great Demand

JOSEPH A. RIGBY

Brooks Oil Co., Pittsburgh: "Necessity for more economical operations in all types of industry is a factor which creates a problem for help on the part of lubricant manufacturers. While continued progress in the improvement of lubricating values by research and product developments are factors, another phase is now of importance.

"Current trend may be termed the movement in demand for multi-purpose or all-purpose greases. This is a matter of economy on the part of the consumer for minimum inventory, simplification in methods of application and ease of routine in purchases. Versatility of service with plastic lubricants having the necessary qualifications is possible with available products.

"These products are of consistency for year round service in automatic greasing systems or other methods of application and have been proved for performance under the most severe and exacting services. Costs are moderate, consumption can be decreased, storage space reduced, and training of personnel for application can be a simple problem with the elimination of the hazard in use of the wrong lubricants."



Mechanical Gear Lubrication To Result in Big Savings

FRANK L. GRAY

Lubrication engineer, Carnegie-Illinois Steel Corp., Gary, Ind.: "Bearing lubrication in the heavy steel industry has become a fixed mechanical operation. Quality lubricants are being used economically. Open type gearing is no longer being designed for the modern mill. However, the open type gearing is still in use in the earlier designed mills and its lubrication is still in the elementary stage. Protective coating is heated and applied manually by a dipper or swab.

"Grease manufacturers are now offering a solvent-type lubricant. The solvent is mixed with the heavy asphaltum base gear lubricants for ease of application. This eliminates the necessity of heating. When applied it will form a heavy coating after the evaporation of the solvent. Solvents are not lubricants and must evaporate to leave a long lasting, heavy, adhesive residuum on the gear teeth.

"Initiatory work has been completed on the mechanical application of the correct gear lubricant by a centralized pressure spray system with a measured amount of lubricant applied on a short time cycle. The discontinuance of the manual method with the high wastage factor will save labor, material, power and operating equipment, and will insure a cleaner and safer working area."

Proper Lubricants Needed For Today's Rolling Mills

JOHN P. CRITCHLOW

Chief fuels and lubricants engineer, rolling mill section, Gulf Oil Corp., Gulf Refining Co., Pittsburgh: "Producers of steel and steel products have made tremendous strides in the last century not only by increasing volume and variety of production but also by improving quality of products produced. This progress has been largely due to research and engineering know-how.

"Designers and producers of rolling mills and steel processing machinery have also made tremendous strides in the refinement and productivity of their equipment. A quick look at an old hand mill and a modern high speed tandem mill rolling steel at better than a mile a minute, provides an excellent example of this progress. Modern tandem rolling mills are precision instruments with controls as accurate as a good wristwatch. In order to protect the various precision elements of these mills and insure uninterrupted production and minimum maintenance costs, specialized quality lubricants are a necessity. The days when any oil or any grease would suffice are gone.

"The petroleum industry, like the steel industry, has also expanded and progressed over the last few decades through the medium of research and engineering knowhow so that there are available today high quality lubricants of many types suitable for applications involving practically any combination of operating conditions.

These high quality lubricants are the result of improved refining methods and the development of addition agents which when added to lubricants, further improve their stability, their resistance to attack by contaminating materials, their rust preventive characteristics and their ability to carry heavy loads. Such lubricants will adequately protect modern steel making and processing equipment and make possible higher operating speeds if properly applied. This latter statement, 'if properly applied', is extremely important because satisfactory performance cannot be attained unless the right amount of the right lubricant is applied in the right place at the right time.

"To help industry obtain maximum performance from their equipment through the use of the right lubricant in the right place, the petroleum industry maintains a corps of competent engineers, thoroughly trained in petroleum technology and familiar with the design, operation and maintenance of various types of machinery.

"The petroleum industry has spent and is spending a large percentage of their earnings for expanding research facilities and the training of technical personnel, realizing that future progress will depend more and more on research and engineering know-how. Only through these media can our current problems be solved and progress in new fields attained."

Apply Cutting Fluids On Basis of Performance

HARRY A. ERICKSON

Chief engineer, D. A. Stuart Oil Co., Chicago: "Increasingly cost conscious because of steadily stiffening competition, the metal working industries are studying cutting fluids and special lubricants as aids to greater efficiencies. Together with improved use of new processes, including stamping and drawing, precision grinding, high speed broaching, new gear shaping methods and faster automatic screw machine cycling, the more scientific application of cutting fluids is paying dividends in lowered costs and increased output.

"A discriminating approach to the perennial problem of oil or water tends to confirm established practice in applying these products on the basis of performance rather than hypothetical considerations. Research and improved formulation by producers and trained specialized supervision of cutting fluid application in operating plants will undoubtedly be the trend for 1950."

How To Control Rust in Circulating Oil Systems

CLIFFORD C. GOEHRING

Esso Standard Oil Co., New York: "Despite the use of rust-inhibited lubricating oils and the strict observance of precautions to minimize the amount of moisture gaining entry into circulating oil systems, rusting still occurs on metal surfaces not bathed by oil. The minute rust particles formed find their way into the oil stream, and cause damage to bearings, gears and hydraulic and governing devices.

"Although oil cleaning and purifying equipment is capable of removing the finely divided rust continuously, source of the condition is not remedied, and the abrasive particles often pass through the system at least once before removal.

"This situation has been overcome by conditioning the critical surfaces with a hard-drying rust preventive coating which is impervious to both oil and oil-water mixtures. The coating has no deleterious effect on the lubricant, and the vehicle bonds to metal surfaces in such a manner that the coating remains intact and does not soften after years of operation."

New Fluids To Expand Use of Friction Drives

A. R. BLACK

Senior industrial applications engineer, Shell Oil Co., New York: "To meet needs of the steel industry special sheet steel preservatives have been developed. These protect rolled sheets in storage or transit with a thin but highly protective film. Two types of preservatives are available—an oil type and an emulsible type. The latter can be removed with hot water.

"Fluids for friction drives must be exceptionally stable and must protect the contacting surfaces from scoring and excessive wear. At the same time, they must maintain high friction between the working surfaces to insure efficient power transmission. Fluids meeting these exacting requirements are now available and their use is expected to greatly broaden the field of application of variable speed friction drives.

"Wear reducing characteristics are being built into a number of industrial lubricants for use in applications where excessive wear exists, these lubricants find application in gear lubrication, internal combustion engine lubrication and in hydraulic oils. They provide in many instances that added factor of safety to help the designer when high bearing pressures are unavoidable. They find ready acceptance in heavy duty engines where wear reduction can have a marked effect on maintenance costs."

Number of Lubricants To Be Minimized

JAMES G. O'NEILL JR.

Lubrication engineer, Sinclair Refining Co., New York: "Industry is making a concerted effort to minimize the number of lubricants. Many individual plants and companies have succeeded in attaining this end. Others are in preliminary stages toward its accomplishment. The future will see a very definite policy of using relatively few lubricants. Two or three greases, four or five lubricating oils and two or three cutting fluids will, eventually, be the maximum requirements of any industrial plant.

"Advantages make this evolution necessary. The use of many lubricants results in complications causing errors in application which in turn are reflected in maintenance costs. Also, many lubricants involve expensive purchasing, many dispensing units and high labor costs. Few lubricants minimize errors in application, reduce purchasing costs and the number of dispensing units and also lower labor costs through easier handling.

"Simplification opens the door to purchasing at a cheaper price. If, for example, a number of small volume oils are used they are normally obtained in light iron barrels. When one oil replaces five or six or even more oils the volume of one oil increases in proportion. It may then be possible to install a storage tank and purchase by tank wagon, transport truck or tank car. The lower cost through this method of delivery will shortly pay for the tank and yield additional savings. Also when tank storage is employed the oil can be piped to the points of application thereby saving considerable labor and handling costs. This is only one illustration of the benefits derived from simplification of the number of available lubricants."

Good Lubrication Practice Vital to Efficient Production

E. RALPH HARRIS

Alemite Sales Division, Stewart-Warner Corp., Chicago: "In the competitive market with which industry is confronted, a definite recognition of the important part that lubrication plays in the cost of manufactured products must be recognized by more of top management.

"Cost reductions are made by an intelligent recognition of the application of more modern methods. In no phase of industry is this truer than that of lubrication. Personnel in many plants are aware of this and until such time as those people representing management, whether the company is large or small, take an active interest in the methods employed in their respective plants, industry will continue to pay the cost of inefficiency.

"We believe a concerted effort is being made editorially, as well as through direct advertising methods, to get this idea across. We, therefore, look forward to the competitive era ahead with extreme confidence, knowing well that the investment in modern equipment for the handling and dispensing of lubricants is a necessity for all companies who wish to maintain their competitive position and to take advantage of the 'little' savings which, in the final analysis, are the important things in reduction of production costs."

Use Of Iron Powder Machine Parts Increasing Steadily

A. J. LANGHAMMER

President, Amplex Oilite Products, Chrysler Corp., Detroit: "During the past year we have observed particularly a broadening use of Oilite finished machine parts. They provide pyramided economies not only in unit sales price, but also by the elimination of tooling expense on the part of the customer. It is noteworthy that most finished machine parts are fabricated from iron powder, or from alloyed iron powder. Furthermore, the field has broadened from cams, gibs, gears and ratchets to include such other parts as brackets and housings.

"An important feature concerning the last two types, is that frequently an intricate part made from stampings, forgings or die castings (formerly drilled, reamed and employing inserted bearings) is now made in one piece, eliminating machining operations.

"Although finished machine parts of this type are gradually forging to the front, particularly those of iron base, it will require many years to complete the introduction of such units. The field in Oilite bearings, cored and bar stock, permanent filters and special applications such as stainless steel, too, is far from the saturation point."

Select Cutting Fluids On Production Performance

W. C. LOCKWOOD

Supervising engineer, The Texas Co., New York: "Best or most satisfactory method to purchase cutting and grinding fluids is a major problem confronting all users of these type lubricants. Considerable time and energy have been expended in an attempt to set up satisfactory specifications that can be employed in the purchasing of cutting and grinding fluids, which, up to the present time, have not proved very successful.

"Those who have tried to purchase cutting and grinding fluids by specification only learned that products secured from the various petroleum companies did not give the same tool or abrasive wheel performance, although all products used met the specification. These varying results prove that analysis of a cutting or grinding fluid does not indicate fully the quality of these type products. Purchasing by specification also penalizes the users from securing the full benefits possible with new cutting and grinding fluids constantly being developed by the petroleum companies.

"Cutting and grinding fluid specifications should be only employed to indicate the quality of product desired, and should be such that no high quality product is barred. It is recommended that final approval for the purchasing of cutting and grinding fluids be based upon one or more actual machining and grinding operations."

Bearing Manufacturers Study Lubrication

A. R. SPICACCI

Chief engineer, Bearings Co. of America, Lancaster, Pa.: "No revolutionary change took place in the manufacturing of ball bearings during 1949. The trend is one of refinement within the economical limits and also better handling of the tremendous amount of details necessary to produce precision ball bearings.

"For many years, engineers of this industry have been interchanging test data and discussing the question of load ratings. Although there are yet many details to thresh out, definite progress has been made in 1949 in reaching a common agreement on many of the basic questions involved. The existing confusion on load ratings is gradually being eliminated to the benefit of the user of ball bearings.

"Another question that has occupied much attention is lubrication, especially in connection with greases. Synthetic lubricants in connection with subzero and abnormally high temperatures have been the subject of extensive investigations. However, the engineers of this industry have proceeded somewhat cautiously along this line lest we solve one problem by introducing many others. Probably the succeeding years will determine whether these

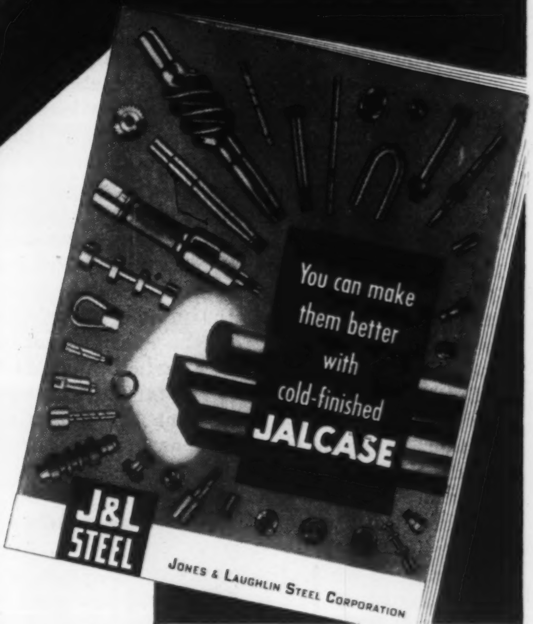
You can make them better with COLD-FINISHED

J&L JALCASE

The original
Free Machining Cold-Finished
OPEN HEARTH STEEL

J&L STEEL

IF YOU WANT
GOOD
. . . machinability
. . . heat treating properties
. . . high cold-drawn physical properties
SAY
J&L JALCASE



You can make them better with cold-finished
JALCASE

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

- ★ **Available in a range of grades to suit a wide variety of applications.**
- ★ **Supplied as cold-drawn or cold-drawn-with-metallurgical-processing, which includes special tempering.**

Typical Jalcase analyses are found in the A.I.S.I. 1100 series. The usual manganese content is 1.00% to 1.65%. J&L, as the originator of these grades, can give you the benefit of years of know-how in the making of steel and the application of Jalcase to your particular requirements.

Some part you are now making can be made *better* from Jalcase with savings in money and time. Write us for a copy of "You Can Make Them Better With Cold-Finished Jalcase."

JALCASE STEEL IS QUALITY CONTROLLED FROM OUR OWN MINES THROUGH THE FINISHED PRODUCT.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Jones & Laughlin Steel Corporation
404 Jones & Laughlin Building
Pittsburgh 30, Pennsylvania

Please send me a copy of your booklet, "You Can Make Them Better With Cold-Finished Jalcase."

NAME____________________
COMPANY____________________
ADDRESS____________________
____

synthetics have a definite place in ball and roller bearing lubrication.

"Associated with the lubricant problem is the seal. Judging by the current patents issued, there is a feverish activity along this line. After all, the effective retention of the lubricant in the bearing is just as important as the use of the right lubricant.

"In connection with the extreme high operating temperatures are the materials to be used for the races and rolling elements. Some work is being done on high temperature steels suitable for bearings. Not much activity is in evidence along this line. Should the demand increase for abnormally high temperature bearings, the progress would be accelerated. It must be borne in mind, however, that in such applications the lubricant is the weak point of the operation of the ball bearings."

Industry Becoming Aware of Importance of Clean Oil

H. V. MILES

Manager research and development department, Honan-Crane Corp., Lebanon, Ind.: "As we look back over the past year, it is obvious that industry has been acquiring a new look—lubrication-wise. Contaminated oil and coolants are no longer being tolerated by cost-conscious managements. Clean oil is the order of the day—the new look achieved through continuous conditioning of the lubricant or coolant while in service.

"Coolant clarification, hydraulic and quench oil purification or filtration have predominated in the metal working field because in these operations maintenance costs, downtime, production quality, etc., contribute to high operating costs—most certainly one of industry's chief headaches.

"Better engineered installations and improved equipment has been the most evident advancement in the oil purification field during the past year. This stems largely from experience gained in the last few years as large manufacturers have led the parade in installing central systems, particularly for the clarification of coolant and mineral cutting oils. Greater emphasis on stream pollution has had some part in directing attention to the continued re-use of coolant through effective clarification, in some cases eliminating the soluble oil disposal problem.

"Incorporation of sludge-conveying systems with coolant clarification equipment has been a notable advancement during the past year. Conveying systems are generally of the endless-chain tubular type that permits transference of sludge from existing tanks or settling basins to a convenient disposal point.

"Individual units, too, have received more attention, as they contribute to higher operating costs and decreased production efficiency. This includes all types of hydraulically operated machinery, such as stamping presses, injection molding machines, die-cast units, scrap balers, briquetting machines and various types of machine tools.

"Incorporation of filters and purifiers on hydraulic machines generally shows important savings as maintenance and down-time costs are reduced. Continuous conditioning of the oil removes its abrasives and sludge-forming constituents that eventually take their toll on production units.

"On the overall picture, oil suppliers and filter manufacturers have become increasingly aware of the importance of closer co-operation in working out oil conditioning applications. In this respect, significant strides have been made.

"Immediate future in the oil conditioning field holds promise for a material increase in the demand for equipment that will insure real savings in the metal working plants. The trend to lower costs, better engineered filter elements continues. The most significant trend, of course, is the increasing industry awareness of the importance of clean oil."

Chlorinated Hydrocarbons Aid Cold Forming of Stainless

E. L. H. BASTIAN

Staff engineer, lubricants department, Shell Oil Co., New York: "Last year ferrous metalworking industries witnessed both new methods and continuing development of older methods in the use of metal working lubricants and process fluids. For heat treating steel parts, particularly in the automotive industry, martempering to replace more conventional quench methods is gaining considerably more impetus. Metallurgical merits of the process do not require any expansion here.

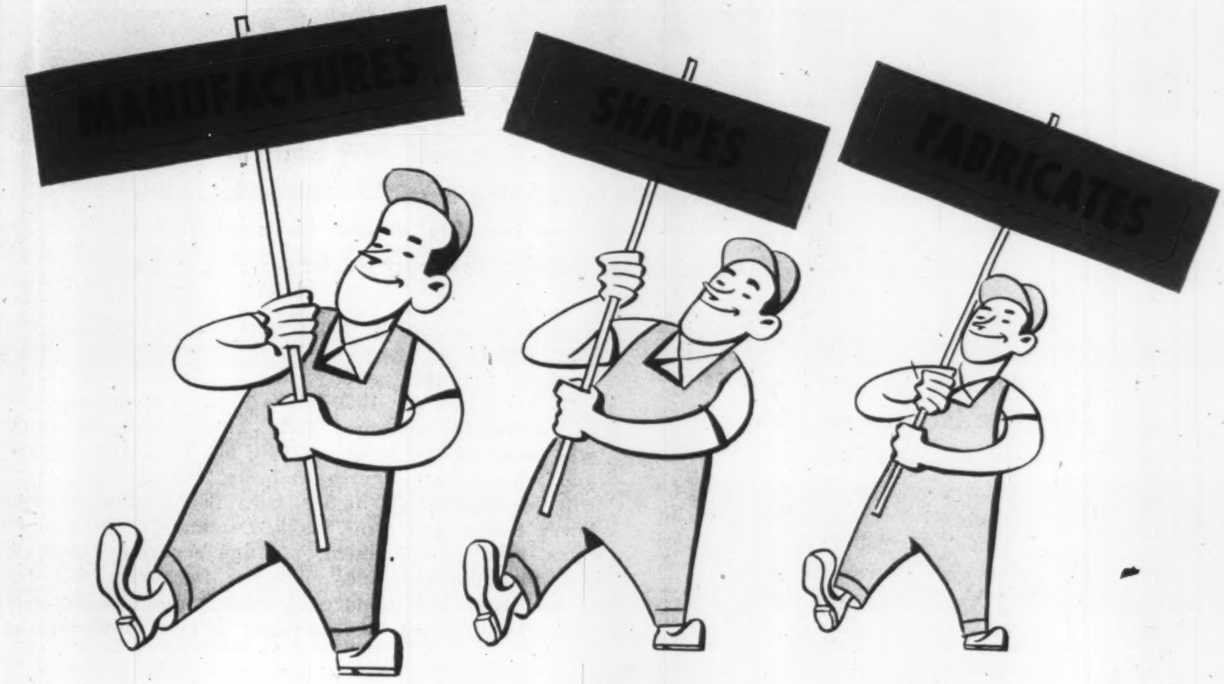
"Of interest, however, is the proved use as martempering media of highly stable mineral oils for quench bath temperatures up to about 400° F. Some specially refined oils show excellent service life and resistance to thickening, sludging, cracking, and oher usual deterioration at this temperature in service. For higher bath temperatures, where required, the more conventional salt baths are still preferably used, however.

"For the press working, drawing, and extrusion of steel, both carbon and alloys, several practical developments have either proved out or shown substantial promise. For cold extrusion of steel (based on the earlier World War II work of the Germans) and for stainless steel tube drawing, new techniques in the use of phosphate surface coatings and other surface treatment preparatory to the application of conventional water based lubricants, permit operations heretofore either impossible or extremely costly to perform.

"A concurrent but quite different development in the same field is the increasing use of heavy, chlorinated hydrocarbons and waxes for cold forming alloys, particularly the stainless series. Successful adaptation of lubricants for spinning type 446 stainless into cones suitable for television tube construction is a case in point. Another is the bench drawing of stainless steel and beryllium copper alloy tubes used for sportsmen's fishing rods. Similar lubricants are successful for drawing stainless steel wire and rod.

"All purpose, low cost steel cutting oils incorporating synthetic constituents of a chemical nature to replace fats and older type compounds are making definite headway in this year's metalworking activity. Increasing industry interest in dual-purpose machining and lubricating oils for use in automatic and semiautomatic screw machines is evident, as is also the case for new improved heavy duty soluble oils to replace mineral cutting oils formerly considered essential for such work as broaching, hobbing, threading and gear cutting."

Ostuco does all three...



ELECTRIC WELDED TUBING

Now you can cut production costs, improve product quality, and get faster deliveries, by using OSTUCO Electric Resistance Welded Steel Tubing, because OSTUCO has expanded facilities for doing *all three* tubing operations — manufacturing, shaping, and fabricating.

OSTUCO procures the raw materials . . . produces Carbon Mechanical Grades of electric welded steel tubing in a broad range of sizes and shapes . . . quickly meets your most exacting requirements in all types of fabricating operations. We are also in a position to supply the tubes painted or plated.

OSTUCO's single source operation eliminates unnecessary freight charges. Unified control of production assures highest quality. Speedy shipments enable you to operate with lower inventories. Prompt engineering assistance and job quotations without obligation. Write direct or to our nearest Sales Office for new free booklet "OSTUCO Electric Resistance Welded Steel Tubing."

OSTUCO

THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric-Welded Steel Tubing

Plant and General Offices: SHELBY 4, OHIO

Sales Offices: CHICAGO, Civic Opera Bldg., 20 North Wacker Dr. CLEVELAND, 1328 Citizens Bldg. • DAYTON, 511 Salem Ave. • DETROIT, 2857 E. Grand Blvd. • HOUSTON, 6833 Avenue W. Central Park • LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills MOLINE, 617 15th St. • NEW YORK, 70 East 45th St. • PHILADELPHIA, 1413 Packard Bldg., 15th & Chestnut • ST. LOUIS, 1230 North Main St. • SEATTLE, 3104 Smith Tower • SYRACUSE, 501 Roberts Ave. CANADIAN REPRESENTATIVE: Railway & Power Corp., Ltd., NEW GLASGOW, MONTREAL, NORANDA, NORTH BAY, TORONTO, HAMILTON, WINDSOR, WINNIPEG, EDMONTON, VANCOUVER

OSTUCO TUBING

MATERIALS
HANDLING

Handling to play heavy role in reducing costs . . . Conveyor builders expect good year . . . Handling benefits should be exploited by facts not fad . . . Demand for battery-powered trucks up 50 per cent

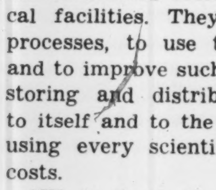
Handling To Play Heavy Role in Reducing Costs

E. F. TWYMAN

General manager, Automatic Transportation Co., Chicago: "In this day of constant economic anxiety, many manufacturers look ahead with a reasonable degree of optimism. For a variety of reasons, they are able to visualize a growing market for their products. At the same time, world affairs prohibit total confidence in the soundness of costly expansion programs. Because there is reason for caution, this is an opportunity to grow by technological advances, investing in new plants only when they are essential beyond doubt.

"Unless there is an unexpected surge in consumption, manufacturers seek to meet demand with present physical facilities. They wish to develop better production processes, to use their employees' ability more wisely, and to improve such phases of their operation as packing, storing and distribution. It is industry's responsibility to itself and to the general public to produce adequately, using every scientific method of restraining production costs.

"We in the materials handling field consider the coming year as of extreme importance, for during it we will be called upon more than ever to effect production economies."



Fewer Foundries Operating —But Capacity Increasing

A. J. GRINDLE

Vice president, Whiting Corp., Harvey, Ill.: "Foundries of this country appear to be reducing in number, but naturally increasing in size or capacity. Large captive foundries are being built where it is possible to use mechanization and cost reducing equipment heretofore impractical for small foundries. Foundries which have been built or now contemplated will use mechanical charging, fuel saving devices, heated metal mixers for providing more uniformity or metal, unique pouring systems, and improved sand handling and conditioning equipment, all of which are designed for more economical and labor saving operation, and, at the same time, producing better quality castings of greater strength and machinability.

"The outlook for 1950 appears to be about as follows in the foundry equipment field: Total volume of business will be about the same as 1949, but in larger capacities and with slightly increased costs. Manufacturing costs will be moderately higher with net profits somewhat lower before and after taxes. Demand for pension systems, stable employment, old age security, health and hospitilization insurance in other industries will make it necessary for foundry equipment manufacturers and foundries to adopt various plans to keep employees contented."

Handling Benefits Should Be Exploited by Facts Not Fad

R. W. MALLICK

Executive department, East Pittsburgh Division, Westinghouse Electric Corp., Pittsburgh: "There is no doubt that materials handling is an extremely fertile field for cost improvement. Few industries can afford to pass up benefits provided by carefully engineering materials handling methods. Yet materials handling is still not looked upon with a degree of importance in many industries.

"Most firms still do not have a materials handling staff, or even a materials handling engineer who has a place in the organization on par with other activities. Few consulting engineering firms are in a position to offer a real 'down to earth' materials handling engineering service. There is so much 'cream' to be skimmed that no issue is taken with reports that have been made in the way of huge returns as a result of materials handling changes.

"Wise management is not going to be caught in any materials handling fad. The field is too new to be approached without caution and realism. A few things to remember are:

"Present accounting practices leave most firms without a true picture of their materials handling costs. Special cost analyses are usually necessary when making a study of techniques. Unless a thorough materials handling study is made by competent personnel, the result may be higher rather than lower costs. Direct labor may be eliminated but cost and maintenance of equipment selected to replace labor may overbalance savings. Fixed burden may 'wash out' long range profits.

"The true objective—elimination of unnecessary handling—is being overlooked in many cases because of an 'improvement approach' rather than complete elimination. Material should not be handled unless necessary to give it 'place utility.' In some instances, reduction of manual effort in handling has resulted in increased 'feather bedding.'"

Vertical Wire Storage Increases Area Capacity

A. F. ANJESKEY

Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O.: "Vertical storage of paper rolls suggested the possibility of solving one of the problems confronted by the wire industry, and that was storing rod or wire in such manner that the greatest capacity could be obtained per square foot of storage area, and at the same time separate sizes, heats, alloys so they could be taken from storage.

"This resulted in the development of the vertical stacking hair pin hook carrier which makes possible unloading rod from gondola cars in 3300-pound unit loads, and laying in the car in the horizontal axis and delivering and placing in the storage area in the vertical axis. Storage capacity per square foot is increased from approximately 450 to 1000 pounds per square foot in a column 22 feet high. In addition, it is possible to separate the various sizes, heats and alloys, as each storage column can be classified. With former methods, where classification or separation of sizes and alloys was necessary, the average storage per square foot of area was around 300 pounds per square foot.

"Even if the development of the carrier had not resulted in increased storage capacity, the fact that separation of sizes and alloys is possible alone justifies the installation of such unit, as the savings effected by the elimination of rehandling represent quite an item of the cost of handling rod from the gondola cars to storage and to other departments for further processing."

Idle Mill Time Is Reduced By Conveying Systems

L. O. MILLARD

Assistant general sales manager, Link-Belt Co., Pittsburgh: "Steel manufacturers are becoming more alert to the contribution afforded by improved materials handling methods and equipment in reducing overall production costs. This has resulted in a trend toward applying the same ingenuity and effort to the solution of materials handling problems that led to the development of our present high-capacity mills and efficient processes.

"Productive time of existing machines has been increased by equipment that provides dependable, economical and safe transportation of materials. Idle mill time has been reduced by the use of conveyors that carry materials in process, providing active storage under control of mill operator.

"Yield from existing mill facilities has been increased by equipment that handles semifinished and finished materials with minimum damage. This objective has been accomplished in recent modernization programs in the design of conveying systems for handling coiled strip from the hot mill on.

"Conveyors have improved safety conditions by reducing the number of crane movements, and by eliminating the travel of vehicles in the vicinity of mill crews."

Battery Research To Be Intensified in 1950

M. W. HEINRITZ

Vice president, Gould Storage Battery Corp., Trenton, N. J.: "An immensely augmented research program initiated 4 years ago produced, during 1949, the answer to one of the most vexing problems faced by industrial storage battery users—excessive positive grid peroxidation.

"Progressive solidification casting techniques, and a radical new grid design have reduced porosity 85 per cent, and increased resistance to peroxidation 66 per cent in the new Z-type plate. Users may now reasonably expect modern batteries to give measurably greater service in these improved battery types.

"Field engineers have devoted much effort to its long-term educational and maintenance program on battery service and care during 1948. By means of battery schools, educational editorial material in the trade press, and periodic inspection of installations, these engineers are helping battery users to obtain more ton-miles from their battery than thought possible before."

Materials Handling Analysis Cuts Indirect Labor Costs

J. K. GANNETT

Vice president and director of engineering and research, Austin Co., Cleveland: "Progress being made in the closer integration of production activities in many industries has led to a basic shift in the approach toward material handling problems.

"Instead of placing major emphasis on selection of the particular type of equipment best suited for specific handling functions, more and more production men are striking at the root of their problems by eliminating, to a large extent, need for repetitive handling.

"The mere fact that only a very few industries can ever reduce their materials flow to a relatively automatic basis does not preclude the attainment of significant savings through layout or other changes in almost any plant.

"Insofar as new plants are concerned, they cannot be designed properly without considering the probability of basic changes in the production scheme, as well as the immediate requirements of operation. Elimination or solution of handling problems is so closely related to load-carrying characteristics of framing and floors, and clearances desirable for most efficient use of floor space that such aspects of design demand consideration from the outset.

"Savings to be realized by thorough advance analysis of all of the materials flow and handling within a given plant have, in more than one instance, saved as much in indirect labor cost as more efficient production machinery and improved product design have done to reduce direct labor expense."

Mechanical Handling Does Not Cut Out Need for Labor

ADOLF LARSEN

Vice president, Gerrard Steel Strapping Co., Chicago: "Despite popular belief, the tremendous increase in mechanization of modern materials handling does not tend to decrease the need for labor. It does eliminate tremendous personal physical effort, and its attendant fatigue. It leaves the worker with a sharper mental perception and an ability to do more with the increased mechanical means.

"The additional related mechanical equipment, at the same time, comes in for its share of use, contrary to that same popular belief. For example: Pig iron, zinc and aluminum pigs normally used to be loaded and unloaded in gondola cars. Today these pigs are self-palletized with galvanized round steel straps, moved by fork trucks in and out of box cars. Instead of manual labor, they require strapping machines and round steel straps, a fork truck for loading and another for unloading. But the laborers, three in number, do far less arduous work in operating the strapping tool and the two fork trucks than they would have done.

"This is also true of bricks, steel products and most palletized materials today. It means an extension of mechanical equipment that may be applied to the movement of other plant materials."

Materials Handling Potential —Now $3½ Billion

LESTER M. SEARS

President, Towmotor Corp., Cleveland: "Today we see all industry fighting to maintain and hold profits. Each day competition for the consumer's dollar becomes keener. Manufacturers are constantly seeking new and more efficient ways to cut down production costs, striving to make a better product for less money in order to meet a competitor's prices, working to squeeze the last drop of production efficiency out of machines.

"Those who have discovered the savings possible with efficient mass materials handling are cutting costs in production. Efficient, mechanized materials handling saves tremendously on labor costs alone (and today cheap labor is a thing of the past); it also saves on valuable warehouse space, by stacking to the roof, freeing needed production floor areas without necessity of enlarging present buildings; it makes possible faster movement of raw materials to production lines and finished products to storage and shipping docks, thus saving on time and delay.

"No wonder materials handling has become so important in the nation's economy. Proof of this is seen in the currently existing potential of new business in materials handling equipment—estimated to approximate 3½ billion dollars."

Conveyor Builders Expect Good Year

F. E. MOORE

Chairman, board of directors, Mathews Conveyer Co., Ellwood City, Pa.: "It seems reasonable to believe that 1950 will be a year of very good business in some industries, and that it perhaps will be one of not so good business in some others. It is also probable that the volume of business generally, in all industries, will be slightly below the 1949 level. We expect the manufacturers of conveying equipment to be quite busy in 1950. The increased cost of doing business is causing almost every manufacturer to become keenly aware of his materials handling expense, and to concentrate on means of reducing it.

"While 1950 will not be a year of record business volume for the conveyer people, it should be one of satisfactory activity."

Truck Prices Low in Relation to Labor Costs

D. L. DARNELL

Vice president, Baker Industrial Truck Division, Baker-Raulang Co., Cleveland: "Industry's contribution to the post-war economy has, in a large measure, been due to improvements in methods which have enabled manufacturers to turn out more and better goods at little or no increase in price while paying higher and higher wages.

"A very important contributing factor in this program has been the improvement in material handling methods which resulted in large savings in handling costs and also lower manufacturing costs due to better organization of manufacturing methods. During this period the electric industrial truck industry has done an outstanding job and, in spite of 100 per cent increase in labor rates is turning out better fork trucks today than before the war at only 5 per cent increase in price."

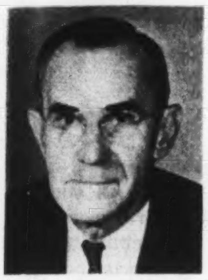
Mechanical Muscles Replace Human Brawn

F. J. SHEPARD JR.

Lewis-Shepard Products Inc., Watertown, Mass.: "Not alone the higher wages for labor but also new thinking on the part of labor have combined to make customary methods obsolete. Labor wants less work along with higher wages, and in almost no other branch of manufacturing has there been so much physical labor as in the handling of materials.

"Much has been done already to lessen this toil but because materials handling costs lack the glamor of production figures it has become about the last subject to be tackled, and there remains a lot to be done with it. Imagination is beginning to function actively. New methods and new equipment are constantly appearing. As usual, the most progressive managements set the pace; competition will gradually force the followers to join the procession.

"Manufacturers of materials handling equipment are more than salesmen for their lines. They are allies to those to whom they sell—designing, developing, pushing, prodding in the good American way. Result must be both the cutting of costs and much substitution of mechanical muscles for those of men."



Demand for Battery-Powered Trucks Up 50%

WM. VAN C. BRANDT

Managing director, Electric Industrial Truck Association, Philadelphia: "Most significant industrial trend, as reflected by material handling development and the activities of the electric truck industry during 1949, is the continuing growth of preference for the versatile fork truck. More than three-fourths of all electric trucks now being built are of this type and the total number delivered during 1949 appears likely to exceed that for 1948 in spite of some reduction in demand for all types of industrial trucks.

"An important factor, and one that may become of major significance, was an indicated increase of more than 50 per cent in the demand for battery-powered trucks for transportation services. For the first year since the war's end this field of application required nearly as many new electric trucks as the leading industries. Development of industrial truck methods of handling in distribution is being watched with great interest because industry needs and is demanding an eventual efficiency in this field equal to that demonstrated during war emergencies and equal to that attained in many individual plants. Shipment of unit loads designed for fork truck handling is increasing, especially in car lot quantities."

Cost-Cutting Plans To Keep Crane Industry Busy

F. M. BLUM

Overhead Traveling Crane Division, Harnischfeger Corp., Milwaukee: "During the past year, the overhead traveling crane industry has operated in a normal market. Construction of new plants has not been the sole source of business, since replacement of old obsolete cranes with modern high speed cranes has provided a greater share of the total industry business than heretofore.

"There are still many cranes operating in industry that are 40 to 50 years old. These are very costly to maintain, slow in operation. Since the entire steel working industry is very much cost minded, the replacement of such old obsolete equipment is definitely a source of cost saving. Round-the-clock operation that many of these old cranes were subject to during World War II has also contributed to the speeding up of their replacement.

"Higher speed operation of the modern crane definitely aids in the economy of material handling. This, coupled with additional safety features and better vision afforded the crane operator in the form of modern all-vision cabs, has given greater ease to the operation of overhead traveling cranes.

"The crane industry looks forward to the coming year as a year of increased activity."

Cost of Materials Handling Depends on Management

J. W. WUNSCH

President, Silent Hoist & Crane Co. Inc., Brooklyn, N. Y.: "We have come into the 'Decade of the Material Handling Engineer.' We shall see the broad development of the science and art of materials handling. We have very nearly reached the maximum optimum of our tools of production. From here on the bright prospects of a rich vein are in the direction of reducing the costs of handling, which is to say the cost of picking things up, transporting them and laying them down.

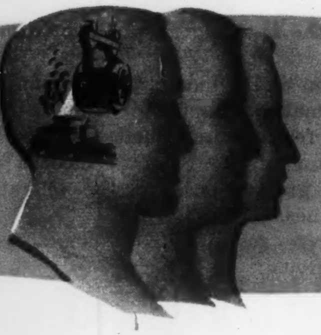
"Continued industrial development of our country, continued advance of the standard of living for our people, depend rather on the greater productivity of the individual which depends on the betterment of relations between management and the worker and upon reducing the cost of materials handling, which depends upon enlightened management alone."

Proper Materials Handling Cuts Production Line Costs

JERVIS C. WEBB

Treasurer and general manager, Jervis B. Webb Conveyor Co., Detroit: "Bankers and economists have frequently said that 1949 should be entitled 'Inventory Year.' The material handling industry in general, and the conveyor industry in particular, are very conscious of this.

"For in the desperate cost cutting efforts of manufacturers to weather the transfer from a sellers to a buyers market, they have recognized the heavy costs of excess goods in process and finished parts. Then, in cutting inventories to the bone, manufacturers found increased costs occurring on their production lines due to holdups and bottlenecks because of the thin line of goods in process. In like manner distribution was hampered by diminished storage banks. To solve these problems mechanized handling installations were made to make inventories more mobile. Where in the past to sell conveyorized storage of parts in process there usually had to be coupled a need to cool the product or inspect it or process it in some way, many installations are now made bringing considerable savings to the manufacturer through their pure ability to eliminate rehandling in temporary storage and to make immediately available a bank of assemblies in case one department fell behind another in production."



METAL PRODUCTION

Abundance of steel one way to protect profit system . . . Brisk demand for zinc seen . . . Tap-to-tap time cut by checking operations . . . Iron ore supply problem approaches critical stage . . . Specialized refractories boost furnace life

More Obsolete By-Product Coke Plants To Be Replaced

W. A. LEECH JR.

Engineering and Construction Division, Koppers Co. Inc., Pittsburgh: "Modernization, replacement and addition to the by-product coke plants, serving the steel industry, have been continued during the past year, although some projects have been delayed or impeded by strikes.

"New developments in oven doors, coal larry cars and improved ascension pipe arrangement keep us in the van in by-product coke oven design. A new spray-type ammonium-sulfate saturator, of all stainless steel and including an integral acid separator, saves expensive space and material. One of these units is now operating at a very low over-all differential gas pressure producing excellent salt with considerable reduction in power consumption of the gas exhausters.

"Since many of the by-product-coke ovens and plants built during World War I and shortly thereafter are now becoming expensive to operate and obsolete in design, we anticipate considerable activity in the construction of new ovens and by-product equipment during the coming year."

Tap-to-Tap Time Cut by Close Check on Operations

J. L. BRAY

Professor of metallurgical engineering, Purdue University: "With the disturbed economic, industrial, and governmental conditions now confronting the steel industry, almost as serious, fundamentally, as in the early days of the recent war, it would appear wise to examine thoroughly all possibilities of increasing steel tonnage with our present physical plant. We have given much attention (attended with considerable success) to new refractories, improved furnace design, use of oxygen, etc.

"A fertile field lies in the increase in *time available* for steelmaking in the basic open-hearth furnace, that is in the reduction in 'outages'. The new tamped hearth has been a major factor, but 'there is gold' in such operational hills as the design of elevators, conveyors, platforms and pallets for handling the rebuilding materials; in means provided for removing debris incidental to the rebuilding of hearth, roof and slag pockets; fans for forced cooling and better rebuilding schedules so that time will be saved, not only in the rebuilding of the furnace in question, but also in the adjoining ones where normal operations are interfered with. In one plant with which the writer is familiar the tap-to-tap time has been reduced, practically solely by close attention to these outages, from 10 hours and 40 minutes to 10 hours and 15 minutes—a notable additional tonnage of steel for a large shop."

New Steel Production Techniques Expected

G. G. BEARD

Vice president, United Engineering & Foundry Co., Pittsburgh: "Last year contracts for new heavy rolling mill equipment for both ferrous and nonferrous industries in the U. S. A. were less than for any year since 1945. However, backlogs carried over from the previous year and a large volume of foreign contracts, in the most part financed through ECA, resulted in full operations throughout most of the rolling mill machinery industry.

"As to the prospects for 1950, the effects of the coal and steel strikes are likely to be felt through diminished funds for capital expenditures. Orders for new equipment will more likely be for necessary replacement of deteriorated or obsolete machinery rather than for expansion. Emphasis will be placed on cost saving and efforts of machine and plant designers will be concentrated in this direction.

"Assured of a reasonable period of full operations, the metalworking industries will undoubtedly instigate plans for large-scale replacement of obsolete equipment for future installation. Further, the development of new iron deposits will ultimately result in the installation of new plants at strategic locations. Development of these plans will undoubtedly uncover for commercial use new developments now in the engineering stage. While

THESE ARE McKEE SERVICES TO THE IRON AND STEEL INDUSTRY

Plant Design and Engineering

McKee designs complete Iron and Steel Plants including Sintering Plants and other facilities for preparation of raw materials, Blast Furnaces, Open Hearths, Rolling Mill installations, Power Plants and any auxiliary facilities for complete Iron and Steel Plants.

Purchasing and Expediting

McKee buys all material and equipment, expedites procurement, makes necessary inspection and schedules arrival on the job at the proper time.

Construction and Installation

McKee field crews execute all stages of plant construction and installation of equipment from preparation of the site to completion of the project ready for operation.

McKee Experience

An inherent characteristic of all McKee services is *thoroughness*. This is a result of experience gained in repeatedly executing the multiplicity of details composing any large project. It is the factor that assures sound, practical design and engineering—prompt, economical procurement of materials and equipment—rapid, low-cost construction.

ARTHUR G. **McKEE** & COMPANY

ESIGN, ENGINEERING AND CONSTRUCTION FOR THE IRON AND STEEL AND PETROLEUM REFINING INDUSTRIES

ENGINEERS AND CONTRACTORS • ESTABLISHED 1905
2300 CHESTER AVENUE, CLEVELAND
30 Rockefeller Plaza, New York, N. Y.

n & Steel Division of Arthur G. McKee & Company is represented in England by the McKee Iron & Steel Division of HEAD, WRIGHTSON & CO., LTD.

as yet no revolutionary developments have been disclosed for the production of finished metallic products from the ingot stage, new techniques in the art of heating, rolling, forming, heat treating, finishing and coating should be forthcoming in 1950."

Raw Materials for Steel Industry Much Improved

D. T. ROGERS

Assistant director of technology, Jones & Laughlin Steel Corp., Pittsburgh: "The steel industry's position in regard to raw materials has definitely improved. The anxiety that existed a few years ago brought about an increased tempo in geological exploration, and stimulated research work on known deposits of intermediate and low grade iron ores. Many domestic deposits are not direct shipping grades, but require certain treatment before they can be used in the blast furnace. The progress that has been made toward satisfactory beneficiation of these ores is encouraging for the future. The richer deposits of Venezuela and Labrador offer increased encouragement, notwithstanding the present problem of transportation.

"Research work on raw materials has not been confined entirely to iron ore. Considerable attention is being centered on coal, since reserves of metallurgical coal are steadily diminishing. The quality of the coal as delivered from underground is also adversely affected by the change from hand loading to modern mechanized methods, since no sorting can be done. Coal research has advanced far beyond the stage of beakers and small samples and has resulted in the construction of specially designed coal washing plants, capable of both separating and blending grades."

Southern California Ore Smelted Successfully

F. M. RICH

Vice president in charge of operations, Kaiser Steel Corp., Oakland, Calif.: "Most of our activities are confined to the various problems arising from the design and construction of the new battery of 45 coke ovens and the additional by-product recovery equipment. We have done considerable work on coal blending and testing problems that are of particular interest to this plant.

"During 1949 large tonnages of iron ore from the Eagle Mountain deposit which is located 150 miles from Fontana in the Southern California desert were used for the first time. The ore has proved to be very satisfactory for blast furnace use and has resulted in an average hot metal production of 1235 tons per day with a coke rate of 1427 pounds per hour. The ore averages 55 per cent Fe and contains between 0.20 and 0.80 per cent sulphur. Beneficiation in the form of crushing, screening and sintering results in the removal of approximately one-half of the sulphur. No difficulty has been encountered in removing the sulphur in the sintering plant or the blast furnace, in spite of the fact that 50 per cent of the sulphur occurs in the ore as $CaSO_4$ (gypsum).

"In October, the second blast furnace was blown in at Fontana. This unit is practically a duplicate of the original furnace, which has a hearth diameter of 25 feet 6 inches. The only major difference is the new furnace is equipped with 15 foot bell, as compared with 14 foot 5-inch bell of the older furnace.

"The open hearth department has averaged 19.4 tons per hour for the year to date on an average charge of 38.8 per cent hot metal. Average fuel consumption was 3,330,000 Btu per ton. From all indications, we expect to average between 22 to 23 tons per hour, with the higher hot metal charge resulting from the increased production of iron from the second blast furnace. More extensive use of basic brick in furnace ends proved beneficial in obtaining a softer slag which is more easily pulled on the completion of each roof campaign. Total ingot production for the year 1949 will probably be slightly in excess of the million ton mark, compared with the previous record of 852,634 tons produced in 1948."

Motor-Generator Sets Being Replaced by Rectifiers

W. R. HARRIS

Manager, metal working section, industry engineering department, Westinghouse Electric Corp., E. Pittsburgh, Pa.: "Because of high efficiency and low light load losses, low maintenance, and elimination of heavy foundations, rectifiers have replaced motor-generator sets on a number of steel mill applications. First uses were for supplying constant voltage direct current for dc mill auxiliaries. Total installed capacity is now over 100,000 kw and rectifiers are fast becoming the accepted standard in many mills for this class of service.

"The rectifier also has been given serious consideration as a dc power supply for hot strip, merchant and tube mills, and the like where, except for starting conditions and occasional adjustment, constant potential dc is required. A total of 12 installations with an aggregate capacity of 111,500 kw are either installed or on order considering both U. S. and foreign installations.

"Compared to motor-generator sets, the advantages of the rectifier are: Higher efficiency particularly at light loads, lower maintenance, elimination of heavy foundations, no large starting inrush, and no air cleaning or blower required.

"Disadvantages are: Power factor high but lagging at rated voltage though if voltage is reduced by grid control power factor drops proportionately, ac voltage fluctuations reflected in dc voltage, voltage regulation and control more simple with motor-generator sets, and regenerative braking not feasible because the rectifier will not transmit reverse power."

Cost-Cutting Practices Felt by Nonferrous Producers

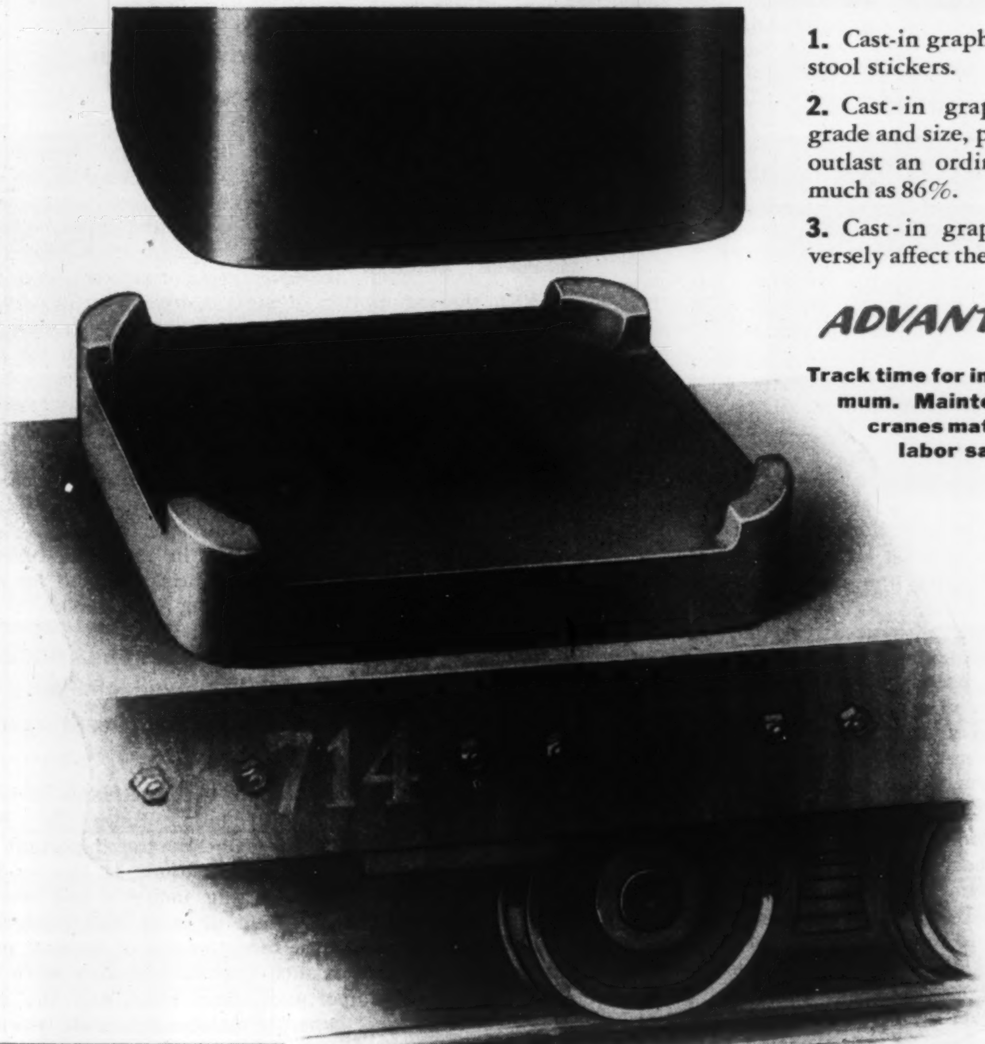
AUSTIN R. ZENDER

Vice president, Bridgeport Brass Co., Bridgeport, Conn.; "Cost reduction practices on the part of metal goods fabricators are making greater demands upon brass and copper mill operators. This means increases in mill processing costs and higher investments in equipment. For example, by cutting down the number and increasing the severity of mechanical operations, the fabricator requires more ductile metals and often closer temper controls and gage tolerances. More special surface met-

ELIMINATE STOOL STICKERS

with "NATIONAL" Graphite Stool Inserts!

*** Here are the conclusions drawn from five years of testing "National" graphite stool inserts:**



1. Cast-in graphite stool inserts eliminate stool stickers.

2. Cast-in graphite inserts, of proper grade and size, produce a stool which will outlast an ordinary all-iron stool by as much as 86%.

3. Cast-in graphite inserts do not adversely affect the quality of the steel ingot.

ADVANTAGES ARE:

Track time for ingot trains held to a minimum. Maintenance cost of stripper cranes materially reduced. Time and labor saved all along the line.

*Write for free reprint of "Graphite Stool Inserts for Big-end-down Molds" from the September, 1949, issue of *Iron and Steel Engineer*. Address Dept.ST.

Use Carbon Mold Plugs for Plug-bottom Molds!

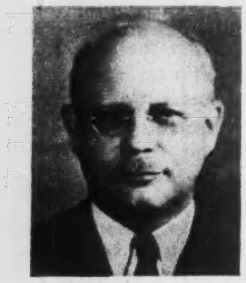
No contamination of ingot. • May be used more than once; no stickers. • Light, strong, easy to handle. • Consistently accurate in dimension. • Resist thermal shock and hot-metal erosion.

The term "National" is a registered trade-mark of
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide **UCC** *and Carbon Corporation*
30 East 42nd Street, New York 17, N. Y.
Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
Foreign Department: New York, U.S.A.
These products sold in Canada by Canadian National Carbon Company, Ltd., Toronto 4.

al finishes call for more careful handling and expensive packaging for greater protection. Also high volume production of bright, scale free metal means newer, more expensive furnaces with controlled atmosphere and automatic temperature regulation.

"Copper-base alloys are playing a more important part in industry for corrosion resistance and engineering applications. Copper alloy tubing is extending its use in the chemical, petrochemical, and refrigeration, heating, and air conditioning fields. Outstanding is Duplex, double-walled tubing made from two different metals in practically any combination of nonferrous and ferrous. Silicon and aluminum bronzes with the strength of steel and the corrosion resistance of copper, are giving longer service life to engineering products and reducing maintenance costs.

"Greater research effort in nonferrous metallurgy and corrosion is essential for the study of corrosion and the development of new and better corrosion resisting alloys. These are needed to meet the increasingly severe operating conditions in power plants and oil refineries as well as to fulfill the requirements for handling new chemical compounds and new products."



Trend in Open Hearths Toward Large Furnaces

L. F. REINARTZ

Assistant vice president, Armco Steel Corp., Middletown, O.: "In coal mining every effort is being made to decrease ash and moisture content of coals going to coke ovens in steel plants. Slower coking rates have helped the physical condition of the resultant coke.

"Blast furnace operators are concerned over the increasing silica and phosphorous content of iron ores. Better mixing and sizing of coke, limestone and iron ore may help this condition. In most existing plants this is difficult to do because of space limitations near the furnaces.

"Operators are watching with great interest the results in increased production and lower coke consumption being obtained in blast furnaces using high top pressures. Blast furnace men seem to have adopted a watchful waiting attitude in connection with the use of all-carbon hearths. It would appear that some changes may have to be made around the tap hole. The tendency seems to favor ceramic construction in that area.

"In open hearth operations the trend is towards large furnaces, equipped with basic ends. Basic roof construction is still in the experimental stage. Lots of thought and action are being directed towards better scrap preparations and faster charging into furnaces. Large electric furnaces are being used for tonnage production of ingots.

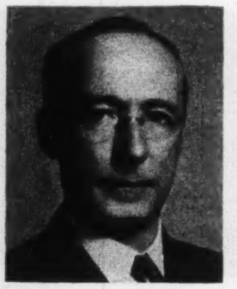
"Good quality low carbon steels have been produced at reasonable cost. A combination of side charging for heavy scrap iron and top charging for light scrap iron, as well as high electric power input apparently can increase tons per hour considerably in electric furnaces.

"Quite a number of new slab reheating furnaces have been added to hot strip mill equipment in some shops, and old slab furnaces have been rebuilt to handle more tons with less fuel cost.

"Drive to decrease the pollution of the Ohio river will mean an intensive study of the control of pickle liquors. By-product plant waste, oil, and grease, as well as other contamination from waste waters of steel plants will necessitate strenuous efforts by the managements of the many steel companies in this great drainage area to eliminate these products from Ohio river tributaries and the river itself.

"Serious situation connected with the intermittent interruption of supply of coal to industrial plants, due to labor disputes or weather conditions, has caused many steel plant managements to study ways and means to improve the flexibility of fuel supply and quality. In many instances arrangements have been made to use a number of fuels. In many steel plants, for example, coke oven gas, natural gas, fuel oil, propane gas, coal, etc. are being used interchangeably.

"Noticeable increase is noted in the demand for hot and cold rolled strip steel in coil form by steel consumers."



Sees Brisk Demand for Zinc Early This Year

ERNEST V. GENT

Executive vice president, American Zinc Institute Inc., New York: "Until the steel strike interfered, 1949 galvanizing operations were on the increase and appeared to be headed for the previous year's record, in terms of zinc consumption.

"With the resumption of steel operations, the backlog of demand, particularly for galvanized sheets, promises the renewal of a high rate of zinc consumption for zinc coating for some time to come.

"Development of coil galvanizing, and new type of zinc coatings, is attracting considerable attention within and without galvanizing circles. Use of zinc in die castings also has been well sustained and proceeds close to the higher levels reached in recent years.

"Although the steel strike definitely killed prospects of new records for zinc consumption in 1949, the renewal of general activity should mean a brisk demand for zinc and accelerated deliveries extending into 1950."

Portability Available in Gas Cutting Equipment

S. D. BAUMER

Manager, technical sales division, Air Reduction Sales Co., New York: "One of the important recent contributions of the welding and cutting industry has been in the field of steel mill production and maintenance. Until the recent easing of demand, pressure on steel mills was such that maintenance work had assumed greater importance than ever, and the need for better and higher capacity maintenance tools was met, in many ways, by new welding methods and means of applying machine gas cutting.

"New types of gas cutting machines, for instance, developed or introduced during recent months included both a portable shape-cutting machine suitable for use in site repairs, and a heavy duty mechanized torch-carrying assembly on a tripod base for scrapping, heavy repair work, and other mill operations.

"A further noteworthy development, in the welding field, is the achievement of high-speed, high-quality au-

MORGAN
MORGAN

Morgan 40″ — 2 High Reversing Blooming Mill direct connected to two 3000 Hp. 40/100 Rpm. motors. Top roll and both spindles are hydraulically balanced by individual cylinders connected to an air hydraulic system. Speeds of motor driven screw down, feed rollers, mill tables and manipulator are regulated by variable voltage control. Mill tables have box section type cast steel girders. Rollers are forged steel equipped with anti-friction type bearing cartridges. All gears have hardened teeth, are totally enclosed and operate in oil. Manipulator is of the electric overhead type with retractable heads affording maximum accessibility to all parts of the mill tables.

sign and build mills and mill machinery for the steel industry. For your next mill and equipment, consult—

MORGAN
Engineering

HE MORGAN ENGINEERING CO.
LIANCE, OHIO PITTSBURGH — 1420 OLIVER BUILDING

DESIGNERS • MANUFACTURERS • CONTRACTORS • BLOOMING MILLS • PLATE MILLS STRUCTURAL MILLS • ELECTRIC TRAVELING CRANES • CHARGING MACHINES • INGOT STRIPPING MACHINES • SOAKING PIT CRANES • ELECTRIC WELDED FABRICATION • LADLE CRANES • STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

tomatic deposition of bronze build-up and overlay materials by means of an inert-gas-shielded metallic-arc, welding process, which sharply reduces time and manpower required per pound of metal deposited, and appreciably improves quality of such important steel mill overlays as aluminum bronze on guides in many instances.

"These represent only a sample of the way in which the trend of progress has moved—and perhaps it is needless to note that such developments, while primarily of interest in steel mill maintenance, are also going to be useful to comparable degrees in other industries."

Beryllium Now Readily Available for Designer's Use

N. W. BASS

Assistant vice president, Brush Beryllium Co., Cleveland: "In general, the beryllium industry last year consolidated its gains of the previous year. Thus interest in beryllium copper alloys, particularly in thin gage strip for pressure diaphragms, springs, etc. continued fairly strong, although at a level below that of the peak year, 1948. Mill-hardened beryllium copper strip, eliminating the need for precipitation hardening by the user, continued to be an interesting development.

"Another development of promise is the new zinc-copper-beryllium alloy developed by Dr. R. H. Harrington of General Electric. The properties of this heat-treatable zinc base alloy compare favorably with those of brass, and its use of zinc in preference to copper gives it a cost advantage which may be instrumental in fostering its wider use.

"Demand for a beryllium nickel alloy containing 2.75 per cent beryllium continued to grow, primarily because of the ease with which this alloy can be precision cast into intricate parts.

"In the pure beryllium metal field, advances in fabrication techniques applicable to this unique metal continue, and it is now available in shapes and sizes almost inconceivable but a few years ago. Great improvement has also been made in its physical properties and purity, and it can now be considered a readily available metal from the engineer's or designer's point of view.

"The question of beryl ore supply has always dominated the industry, and it is encouraging to note that the estimated new supply of beryl in 1949 will be greater than in any year since 1944, and will exceed consumption by perhaps 50 per cent. This does not obviate the necessity for intensive long-range planning to stimulate production of beryl, particularly through such means as the concentration, by flotation or otherwise, of low-grade domestic deposits."

Coke To Continue in Short Supply

PHILIP S. SAVAGE

Vice President, Donner-Hanna Coke Corp., Buffalo: "Decline in steel activity, which was evident in the second quarter of 1949, brought to an end the acute shortage of coke which had plagued most parts of the country since the beginning of World War II. It is my belief that this relief from shortage is going to be short-lived. Almost half the ovens now in operation are more than 25 years old, and the tremendous growth in the use of pipeline gas from the southwestern part of the country is certain to force the closing of a number of commercial coke oven plants which have aided in maintaining an adequate supply of coke.

"Cost of building new ovens today is approximately two and one-half times what it was in 1939, and the cost of coal, which represents 80 per cent of the cost of operating a coke oven plant, has gone up at least as much. Values of gas and the major coal chemicals have not gone up proportionately. This stifling influence will result in a continued shortage of coke whenever the steel industry is working at full production. Certain coal chemicals such as benzol will also stay in short supply.

"Coke oven designs developed in America in the past few years seem to be considered as adequate, and there has been little tendency to change design except where some buyers for the sake of economy have actually returned to the simple rugged design of the early 20's after adding some of the proven modern auxiliary equipment. The spray type saturator for the production of sulphate of ammonia saves space and power, and now has found general acceptance among operators. Spray type benzol scrubbers are being tried out by several operators, and show possibilities of further economy."

Merchant Furnace Progress Helps Foundry Industry

B. C. COLCORD

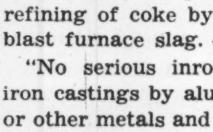
President, Woodward Iron Co., Woodward, Ala.: "Merchant iron furnaces producing for the foundry trade naturally are interested in better ore and coal preparation and have made some progress during the past year with improved mining methods, heavy media separation on ore and more modern coal working facilities.

"Considerable progress has been made in the further refining of coke by-products and improved processing of blast furnace slag.

"No serious inroads have been made on the use of iron castings by aluminum, magnesium, transite, plastics, or other metals and materials.

"Development of nodular iron has opened a field for iron castings which undoubtedly will adapt it to new uses.

"These developments in the merchant iron industry, combined with technical progress in the foundry industry, have served to buttress the fundamentally strong position of iron castings and to extend their uses in competition with other materials."



Sources of Raw Materials Occupy Industry's Attention

C. D. KING

Chairman operating committees, United States Steel Corp., Pittsburgh: "During the past year no outstanding developments occurred in the production of coke for metallurgical purposes and associated coal chemicals. But additions of coal beneficiation facilities kept pace with the trend of increased coal mine mechanization. There was also initiated a promising program in connection with coke evaluation, sponsored jointly by American Coke and Coal Chemicals Institute and American Iron and Steel Institute.

"Long range raw material problems continue to engage the industry's attention, particularly iron ores, both Labrador and Venezuela constituting two major potentials. In addition, the taconite problem moved from the realm of academic discussion to large size experimental installations. A pelletizing plant was placed in operation for the agglomeration of fine ores, and blast furnace tests are contemplated. A large number of downdraft sintering machines for the agglomeration of flue dust and some fine ores were in the process of construction and should be completed in 1950, one such installation including a large rotary kiln for nodulizing ore fines. A comprehensive study of the value of oxygen in blast furnace operation was undertaken at one plant during the past year, involving the installation of a large oxygen plant. A similar investigation is scheduled with the operation of another oxygen plant in early 1950. The use of elevated top pressures was extended to a few more blast furnaces during the year and continues to engage the interest of the industry.

"In steel ingot production technological developments took a number of forms. Renewed interest in bessemer steel ingot production was reflected by the installation of a new large plant replacing a smaller old unit; in another case by the employment of large percentages of blown metal on an exceptionally large open hearth stationary furnace capable of tapping 550 net tons; and the projection of the 'turbo-hearth', a modification of both the basic and acid bessemer processes, whose objective includes the employment of basic iron and the production of bessemer steel with the same chemical composition and physical characteristics as open hearth."

Curtailed Steel Operations Help Refractory Studies

H. M. KRANER

Ceramic engineer, research department, Bethlehem Steel Co., Bethlehem, Pa.: "The word 'performance' is a frequently used word in the vocabulary of the refractories man in the steel plant. The cost of refractories per ton of steel involves several items which change constantly with rates of production, number of furnaces available and many other factors.

"With the disappearance of the present peak demand new evaluations will have to be made on the various elements in the 'performance' picture. At the same time, we must appraise developments and trends established during the war.

"Recent conditions have allowed us to examine, prematurely perhaps, carbon-hearth installations in blast furnaces. This has been quite fortunate as it has given us an opportunity to establish new procedures without waiting for the results of complete campaigns. Our understanding of the mechanisms of wear in carbon hearths has been considerably enlarged by these examinations and the discussions that have ensued. No doubt carbon manufacturers and others contemplating entering the field have also benefitted. The demand for and the availability of super-duty and hard-fired brick for blast furnace linings are now greater than before. Low-alumina silica brick are well established and no doubt figures would, in most cases, show increased production rates through their use.

"Improvements in open hearth furnaces show that the trend is toward enlargement of existing furnaces, installations of new bottoms, and many minor changes in design which will result in improvements in individual furnace operations, time for which could not be afforded in periods of peak production."

Intensified Search for Raw Materials Continues

CHARLES M. PARKER

Metallurgical engineer, American Iron & Steel Institute, New York: "Past year has been one of continued but intensified search for raw materials. Not only have government field parties been active but exploration teams from industry have surveyed promising areas on at least three continents. Coupled with exploration are redoubled efforts to develop beneficiation processes to up-grade known marginal or low-grade materials.

"Among the important new sources of iron ore are Liberia and Venezuela. Mines in those countries will be operated by American steel companies. In Chile, new iron ore mines have been opened which will supply both a Chilean steel industry and an American company.

"Efforts continue with high promise of success to beneficiate the taconites of the Lake Superior region and the low grade brown ores of the South. The marginal ores of the Lake region have yielded to research and medium-sized beneficiation plants are now in commercial operation. Early in the year announcement was made that the low grade ores of the Northern Minette district of Lorraine in France could be economically up-graded to 52 per cent iron. Interest remains high in Labrador ore but up to now only experimental quantities have been flown out. New deposits of manganese and nickel have been announced in Chile and further explorations are being made.

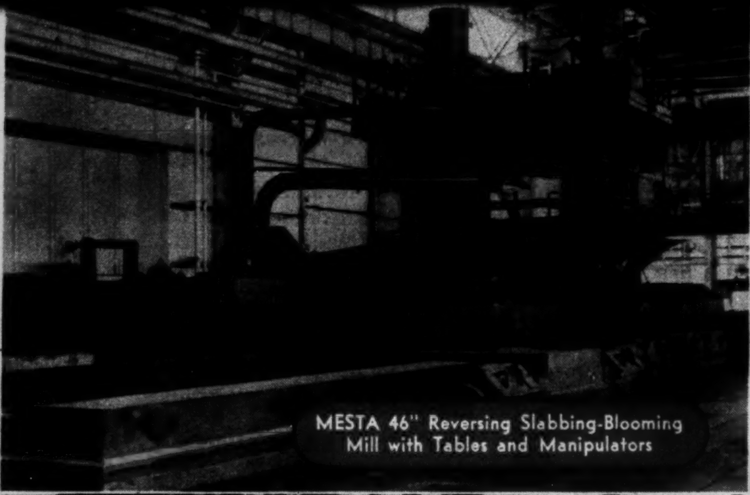
"Recently, word has come out of Russia that the high grade ores of the Urals are being exhausted and that the Kuznetsk and Karaganda coking coals show an increase in ash content to an alarming degree."

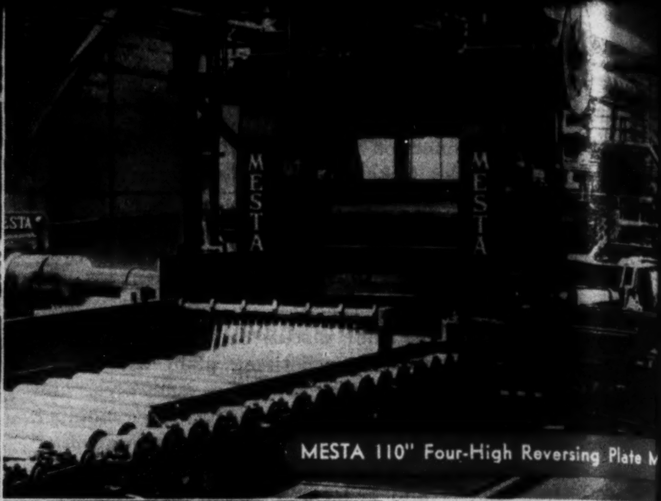
Abundance of Steel Only Way To Protect Profit System

COTTRELL FARRELL

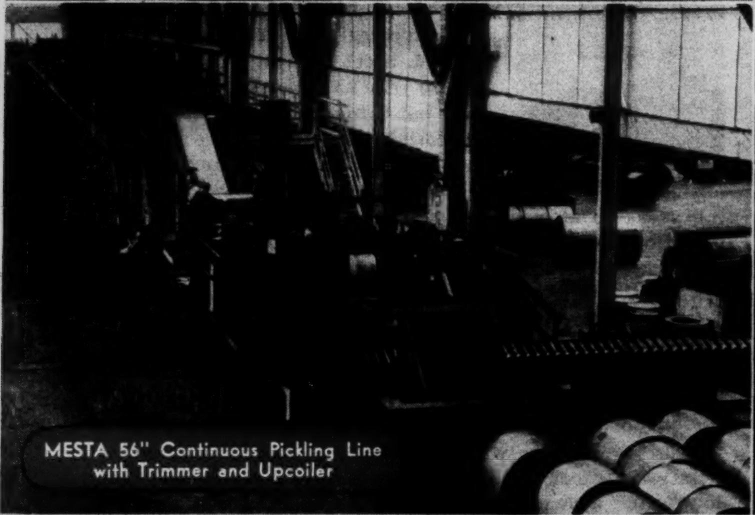
President, Easton Car & Construction Co., Easton, Pa: "To us steel is basic. When we try to evaluate our future we have to keep that fact foremost in our vision. The depth of our potential market, the extent to which we can expand and improve our facilities, and the course of our labor relations and training program are largely predetermined by price and availability of steel. What is true with us is also true with the major segment of lower level American industry, directly as affecting their costs and indirectly as affecting other operating costs of their customers.

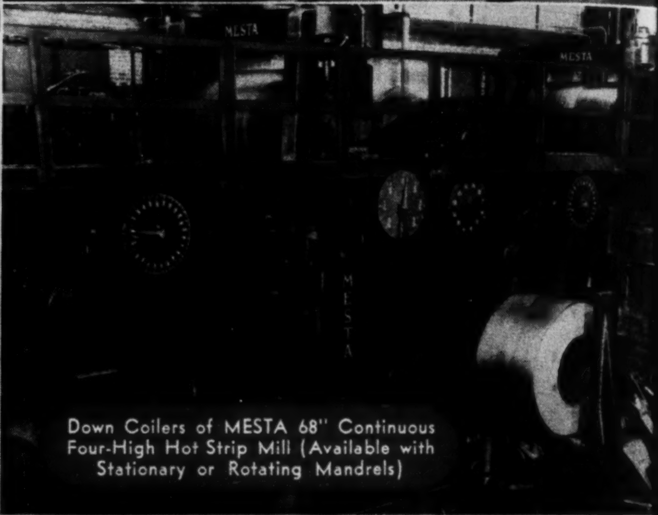
"Before we can begin to achieve the immeasurable industrial progress for which the world is waiting, and


MESTA 46" Reversing Slabbing-Blooming Mill with Tables and Manipulators



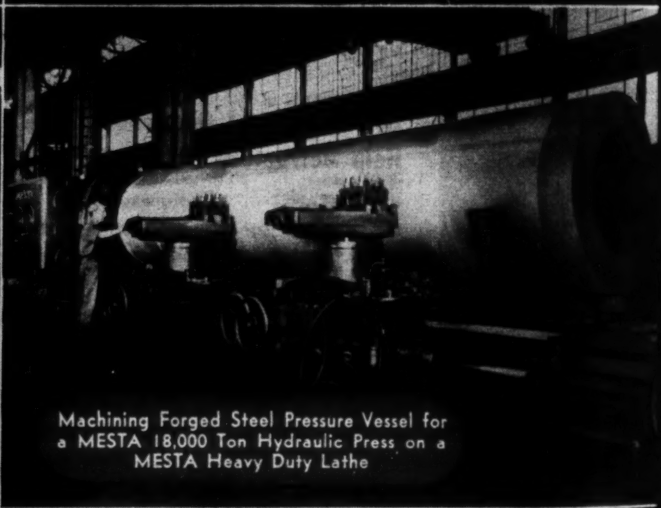
MESTA 110" Four-High Reversing Plate M

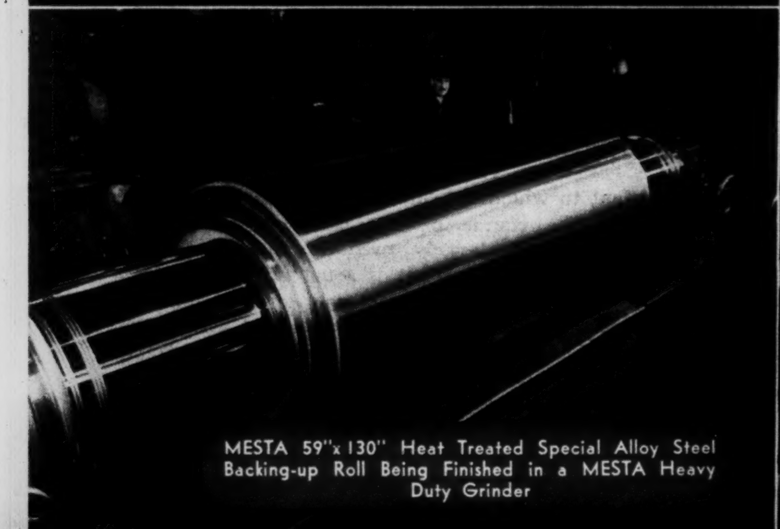

MESTA 56" Continuous Pickling Line with Trimmer and Upcoiler



Down Coilers of MESTA 68" Continuous Four-High Hot Strip Mill (Available with Stationary or Rotating Mandrels)

Battery of Five MESTA 42" High-Speed Electrolytic Cleaning Lines


Machining Forged Steel Pressure Vessel for a MESTA 18,000 Ton Hydraulic Press on a MESTA Heavy Duty Lathe


MESTA 59"x 130" Heat Treated Special Alloy Steel Backing-up Roll Being Finished in a MESTA Heavy Duty Grinder

MESTA 60" Heavy Duty Traveling Wheel T
Roll Grinder

Designed and Built By

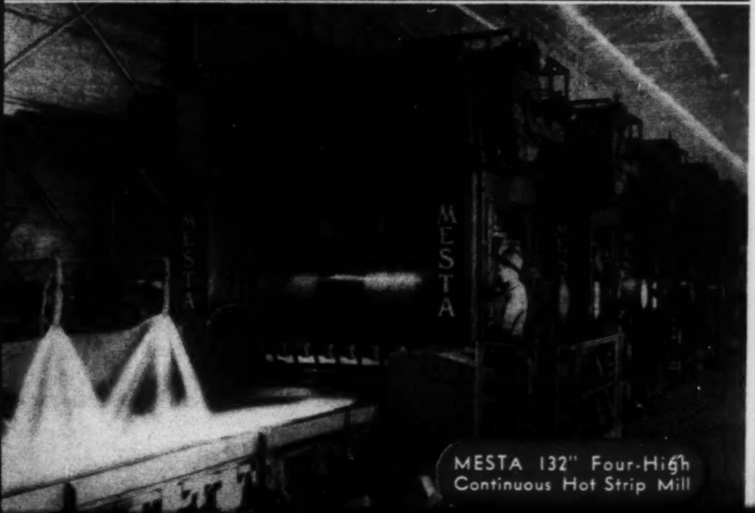
MESTA

MACHINE COMPANY
PITTSBURGH, PENNA.

MESTA 68" Four-High Continuous Hot Strip Mill Finishing Stands

MESTA 56" High-Speed, Four-High, Five-Stand Tandem Cold Mill

MESTA 93" Four-High, Three-Stand Tandem Cold Reduction Mill



MESTA 132" Four-High Continuous Hot Strip Mill

upon which peace will directly depend, we must first come to regard steel as different from all other free competitive American industries. We must recognize steel as the very foundation upon which all the rest of our free competitive economy is built. With this understanding must come a deep regard for the world's expanding need for steel, and for the moral responsibilities which are imposed upon labor and management in the steel producing industry by this basic human need.

"Through 5 post-war years we have been confronted with a stubborn deterrent to industrial progress—fear of 'production for abundance *rather* than for profit', as Benjamin F. Fairless put it recently. We must quell that fear with a red-blooded American understanding of the fact that production of steel for abundance *can* be conducted profitably, and is necessary in order to make production for abundance profitable in other industries. Let us see now that production of steel for abundance will eventually prove to be (or to have been) the only way to protect our profit system short of war.

"If through 1950 we can be assured of ample supplies of steel at prices which can bring our products into line with prices in devalued currency areas, and at prices which will reach down into broader depths of our consumer markets, we are confident that our earth, rock and ore hauling equipment and other heavy-duty material handling equipment, can enter a great new era of development and progress."

Jet Piercing To Aid Processing of Taconite

D. H. FLEMING

Development engineer, Linde Air Products Co., New York: "Economical drilling of primary blast holes in the very hard Mesabi magnetic taconite was one of the stumbling blocks in the commercialization of this source of iron ore. Research and development have culminated in the process known as 'jet-piercing.' Jet-piercing is accomplished by means of a very high-velocity flame obtained from the combustion of oxygen and a hydrocarbon fuel in a burner which is similar in many respects to the rocket motor. The flame which issues from the end of a large rotating blowpipe pierces the rock by a spalling, rather than a melting action.

"First production machine utilizing the jet-piercing principle was placed in operation last summer on the Mesabi range. Piercing speeds and daily footage toward the end of the operating period averaged 18 feet per hour and 90 feet per day, respectively, even though much of the work was done in severe backbreak. Maximum daily footage was 120 feet and the maximum piercing speed achieved on any one hole was 26 feet per hour.

"Considering that regular mining company operators achieved these figures, it is believed that jet-piercing has an attractive future in magnetic taconite."

Nitrogen Degassing Eliminates Porosity Defects

E. F. KURZINSKI

Development engineer, Linde Air Products Co., New York: "Flushing of molten copper-base alloys with high-purity dry nitrogen prior to pouring has resulted in the elimination of porosity defects caused by dissolved gases and has improved the physical properties of brass and bronze castings. Other benefits gained are a cleaner metal because of a reduction in the quantity of oxides and inclusions, a more uniform pouring temperature, and a better distribution of alloying agents.

"New developments have enabled the introduction of nitrogen at flow rates approximately four times those previously possible. A corresponding decrease in the treatment time has been effected.

"The degassing action is purely physical and can be effectively applied to all metals. Studies are now in progress on zinc, lead, and other metals to determine possibility of improving their casting and fabricating properties."

Suggests Use of Reformed Gases for Blast Furnaces

S. P. KINNEY

S. P. Kinney Engineers Inc., Pittsburgh: "Many things have been tried for improving fuel consumption in blast furnace practice, including experiments at tuyere level of the furnace. Some years ago the Germans proposed the admission of flue dust at the tuyeres; others have proposed limestone, coal, and coke have been tried.

"Two large projects are now under way for the use of oxygen at the tuyeres. It is believed that admission of a mixture of highly-preheated carbon monoxide and hydrogen may result in a reduction in coke consumption and improved practice which may result in more economical or better blast furnace practice. The use of a medium amount of such a gas preheated to the temperature of the hearth results in the conservation of fuel, and in turn in a decreased demand on the coke ovens.

"With use of a reformed gas, reduction in the amount of wind blown on the furnace would result due to elimination of nitrogen. The high temperature would be maintained in the hearth section and the hearth and bosh gases would be more concentrated than in ordinary practice. The reducing ability of these gases would be materially increased and in turn the thermo-value of the bosh and hearth gas would be enhanced.

"Due to the reduction in coke consumption in the furnace, there would be a lesser slag volume and therefore less sulphur transfer to the iron. The use of reformed gases in the hearth of the blast furnace opens a field of study which has not been very thoroughly investigated and it is suggested that such a gas might result in better blast furnace operation at a reduction in fuel consumption."

Taconite Processing Plant Watched with Interest

E. W. DAVIS

Director, Mines Experiment Station, Institute of Technology, University of Minnesota: "Chief problem before the Lake Superior iron ore producers is the development of additional ore reserves of a nature that will lend themselves to large-scale operations over a considerable period of time—something to take the place of the disappearing Mesabi open pit, direct shipping ore mines. These investigations are moving in four directions: (1) Development of enormous new earth-handling machinery capable of operating economically at depths that are

Bailey

MECHANICAL GOGGLE VALVES
__add__ to
STEEL MILL SAFETY!

Four Bailey Mechanical Goggle Valves installed on Koppers ELEX Precipitator

Designed to protect men and equipment, Bailey Goggle Valves provide a sure, positive seal for shutting off gas mains in emergencies or for repairs. The clamping force is applied equally at all points around the periphery of the disc, assuring a tight seal. Bailey mechanical goggle valves require a minimum of maintenance and can be depended upon for safe, instant service when needed. May be totally enclosed if desired. Used for gas washers, blast furnace mains, precipitators, boiler plants.

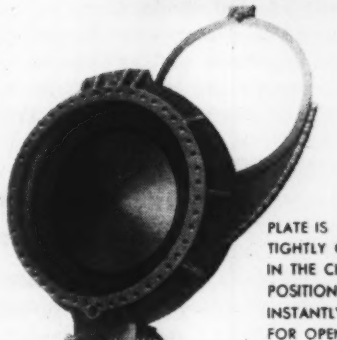


PLATE IS TIGHTLY CLAMPED IN THE CLOSED POSITION . . . YET INSTANTLY FREED FOR OPENING.

RUGGED, DEPENDABLE, SAFE

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD
PITTSBURGH 16, PA

Bailey Mechanical Valves are furnished in sizes from 6" to 72". Bailey Thermal Valves are made in sizes from 48" to 120".

changing mines previously considered for underground operations into open pit mines. (2) Experimental work on new methods and equipment for producing low silica concentrate from low-grade ore material in stockpiles, tailings ponds, mines previously considered exhausted and in new mines opened for the purpose. (3) Processing taconite and the iron formation of the Lake Superior district by magnetic concentration or other methods to produce superior blast furnace ore. (4) Development of new mining districts, particularly in Canada and South America, some of which are involved in the deep St. Lawrence waterway discussion.

Perhaps of principal interest is the taconite processing plant of Erie Mining Co. (Pickands Mather & Co.) at Aurora, Minn., on the Mesabi range. This plant has a capacity of about 200,000 tons of agglomerated taconite per year. If it is successful, there is sufficient crude taconite of the type required for this plant available on the eastern end of the Mesabi to justify production of 10 or more million tons of high-grade, agglomerated ore per year for 50 years or more. Large quantities of similar material exist as far west as Nashwauk and at many other localities in the Lake Superior district."

Clad Metals Help Hold Down Equipment Prices

ROBERT W. WOLCOTT

Chairman of the board of directors, Lukens Steel Co., Coatesville, Pa.: "The American standard of living, already very high, is constantly being improved by the ingenuity and insatiability of our scientists, technicians and engineers. Evidence that they have accepted their achievements only as milestones and not as goals, is reflected in the higher wages now being paid for increased production of better consumer goods at lower cost because of improved equipment at economical prices.

"A technical advance which has made much of this new equipment possible at prices within reach, is the development of clad steels which not only have all the advantages of solid corrosion or erosion resistant metals, but permit important cost savings to be engineered into the job at exactly the locations it is needed—the proper metal in the proper amount for the proper job."

Criteria for Selecting Steel Plant Sites Change

RALPH H. SWEETSER.

Consultant in blast furnace practice, Portsmouth, N. H.: "The old rules governing the selection of a site to locate a plant for making iron and steel do not fit for the proposed New England steel plant, which is the great question in this region today. There is no Pittsburgh seam of coal for the fuel, no Red Mountain for the iron ore, so that the usual rules for locating a steel plant do not apply.

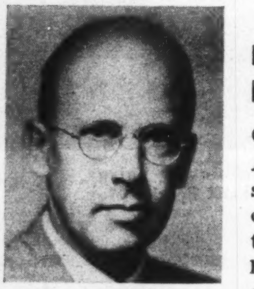
"However the criterion that must rule in New England has already worked at Sparrows Point, Md., at the Canadian Soo, and at Fontana, Calif. At all these sites, both the iron ore and the fuel had to be shipped in from elsewhere. But there was a market for the steel rails made at Sparrows Point in expanding the railroads of the United States, and the railroads of Canada took all the rails that could be made at the 'Soo'. It is reported that the New England market will take all the steel made in the proposed integrated steel plant located on the rocky New England coast. Therefore the trend is a natural."

Air-emplaced Refractories Reach All Parts of Furnace

HARVEY N. BARRETT JR.

Basic Refractories Inc., Cleveland: "Through the use of air-emplaced refractories parts of steel making furnaces that were not easily reached by shovel or other conventional maintenance methods have been rendered accessible. During 1949 a new basic gun refractory, Gundol, passed from the service testing stage into standard practice in both electric furnace and open hearth furnace shops. Improved service life with no decrease in the effeciency of emplacement is the result of using a slightly coarser top sizing in the new refractory.

"In the electric furnace the refractory is extending basic brick sidewall life by as much as 50 per cent with further economies reported to stem from balancing out lining life, decreasing amount of sidewall brick that require replacement on rebuilds, and radically reducing mason hours and delays on hot patching."



Billet Size Ingot Practice Improves Cost and Yield

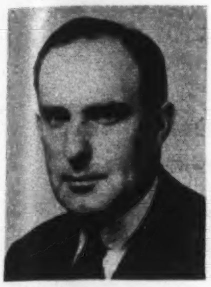
C. F. RAMSEYER

Assistant to president, H. A. Brassert & Co., New York: "Oxygen continues a very live subject, but too few of the new tonnage plants have thus far been placed in operation to allow any definite conclusions to be drawn. Early blast furnace oxygen enrichment results apparently have been disappointing, at least on pig iron, but only one plant has experimented in this field so far. Use of oxygen in basic bessemer converter practice is being actively worked on abroad and could well be experimented on here to advantage.

"Production of good metallurgical coke from noncoking coals appears to be on the way to solution both here and abroad. Success in this field will not only ease the pressure on our diminishing domestic supplies of high grade coking coal but will have even greater significance for foreign countries lacking metallurgical grade coal.

"In electric furnace melting, the high power, high voltage transformer appears to be winning the battle. It has brought the melting rate of top charge 50-ton units up to that of 150-ton open hearths working on hot metal.

"Further interesting developments are in the casting of billet size ingots by small plants without blooming mills; greater lengths and a larger variety of ingot cross-sections than ever before have been attempted with encouraging results. Under favorable local conditions the remarkable results as to cost and yield from billet size ingot practice have made it possible for a number of small plants to compete successfully with the large integrated producers."



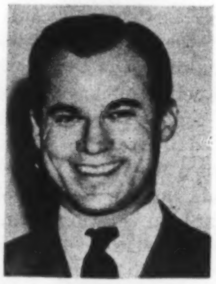
Iron Ore Supply Problem Approaches Critical Stage

C. O. DOHRENWEND

Head, department of mechanics, Rensselaer Polytechnic Institute, Troy, N. Y.: "Industrial research as it is related to the metals industry, especially iron and steel operations, now clearly recognizes two major research problems where before only one was considered to be urgent. The old problem of getting better performance out of the metal by the development of new alloys and better uses of the old ones is still recognized as of first importance. Developments of this kind certainly will be continued and intensified.

"This research need arises from the ever increasing demands of the engineer for better performance. Particularly, users are placing emphasis on the development of metals that will withstand high strengths at high temperatures and also metals that will resist corrosion under extremely adverse conditions of use.

"The new problem is not a new problem at all but one that has always been with us. The new urgency for its solution arises from the lack of proper planning. It stems from the fact that our rich ore deposits are rapidly running out and each shovelful of ore removed from these deposits brings ever closer the time when these ores will be gone. This old problem of developing yields at low costs from a low grade ore will soon be recognized as the problem of first priority in the metals industry, particularly iron and steel."



Difficulties Overcome by Slag Casting Ferroalloys

T. W. MERRILL

Metallurgical engineer, Vanadium Corp of America, Bridgeville, Pa.: "Developments in the ferroalloy industry include both improvements in the processes for the manufacture of standard ferroalloys and the suggestion of new uses for these, or for new alloys. As an example of the former, a patented method of casting ferroalloys has recently been developed by Vanadium Corp. of America. High solidification temperature of many of these alloys, and the viscous, high melting slags which are formed during their smelting, interfere with the obtaining of clean, dense casts.

"Most of the difficulties have been overcome by a new casting process, developed primarily for ferro-chromium but applicable to all high melting metals, involving casting the metal through a special 'casting' slag. This slag is of a composition appreciably lower in viscosity and freezing point than the smelting slag, and at such a temperature that the metal poured through it will not solidify immediately. As the metal passes through the casting slag it is stripped of all smelting slag and of other nonmetallic particles, and settles to the bottom of the container as a rounded button or regulus. The slower cooling of the metal brought about by the surrounding molten slag assures a solid cast with lower internal stresses.

"Separation of the metal from the slag is easily accomplished after freezing, revealing a clean, dense, smooth-surfaced cast, free from discolored surface cracks, and lower in oxygen and nitrogen content. Recovery of metal tapped from the reduction furnace is much higher due to the lower viscosity of the mixture of smelting and casting slags. Steelmakers find that this improved ferrochromium carries appreciably fewer refractory inclusions into the steel and can be added to a steel bath with less loss because of its greater density and more advantageous sizing.

"A new use for an old alloy is seen in the development of a nonaging rimming steel. Mr. Epstein, of Bethlehem Steel Co., discovered that the addition of a small quantity of vanadium to a rimming steel makes it nonaging for practical purposes. This addition, which is generally in the range of 0.03 to 0.05 per cent vanadium, has no noticeable effect on the rimming action. The steel is found to be satisfactory for sheets which are subjected to deep drawing operations during their fabrication. Its ease of manufacture, particularly with regard to surface quality, is considered greater than aluminum-killed sheet steel.

"A development which is very much still in progress is the control of nitrogen in various steels for the purpose of improving their mechanical properties. Recent studies indicate that the composition and mode of occurrence of the nitrides affect various properties of steels, such as susceptibility to aging, grain size, hardenability, impact strength, damping capacity, fatigue strength, work hardening, and many others."

Open-Hearth Shops Install More Basic End Furnaces

RAYMOND E. BIRCH

Director of research, Harbison-Walker Refractories Co., Pittsburgh: "Present trend in blast furnace linings is toward the use of special fireclay refractories that will withstand more severe operating conditions. Foremost among these are special hard burned high-duty fireclay refractories of the cone 18 type which possess enhanced physical properties and, particularly, an unusually high degree of resistance to disintegration by carbon monoxide. Many linings of this class of refractory have been in service long enough to prove their merit and to establish outstanding records.

"Super-duty fireclay refractories of equally hard burn are in comprehensive trials at present. It has been found that after installation of many hearth sections of carbon refractories, difficulties have been experienced, leading to reassessment of this application.

"In the open hearth super-duty silica refractories have become more firmly entrenched during the postwar years as a result of the extension of manufacturing facilities. Progress has reached the point where the importance of a low content of alumina, titania, and alkalies in these products is now fully recognized. Elaborate rock-washing plants involving considerable expenditures have been installed for the manufacture of both the super-duty and standard types of silica refractories, particularly for the extension of life in the openhearth and electric steel furnaces. Along with the greater use of these more refractory silica brick, there is a trend for the more general use of super-duty silica bonding mortars.

"Acceptance of basic end design for basic open-hearth furnaces received further impetus throughout 1949, during which time contracts were placed for the installation of basic ends in 12 furnaces. Forty open-hearth furnaces now are operating with basic ends with definite orders placed for nine more for 1950 installation.

"Basic end design provides for sectionally supported basic brickwork in the four walls of each port uptake and basic suspended roof sections over the port. Among the advantages reported are freedom from silica drip into the slag pocket, making for ease of slag removal, less massive brickwork, facilitating repairs with minimum lost time, and more efficient combustion and faster heat time in existing furnaces, either as a result of increasing uptake areas or of lengthening the furnace bath area without sacrifice to uptake area."

Blast Furnace Practice Faces Revisions

H. A. WHITE

Manager, Smeeth-Harwood Co., Chicago: "As always, the initiative and competitive drive fostered by our country's free enterprise system will undoubtedly continue to bring forth improvements in all phases of steel production and processing. This company is mainly devoted to the operation of blast furnaces. There is considerable disagreement as to the continued availability of high grade ores and coking coals. Sooner or later, of course, blast furnaces, coke plants and even open hearths will, of necessity face drastic revisions in traditional practices. It is quite possible that entirely new methods of production may evolve.

"Certainly, unless we allow our free enterprise system to fall by the wayside, our ingenuity and resourcefulness can definitely be counted on to meet and solve the problems as they arise."

Specialized Refractories Lengthen Furnace Life

S. M. SWAIN

Director of research, North American Refractories Co., Cleveland: "During the war there was a marked swing toward the use of highly specialized refractories in spite of the high first cost of such products. Their use was dictated originally by the desire to keep furnaces in operating condition for as long periods as possible to secure uninterrupted production. As a later development it was found that many of these specialized refractories actually gave a reduced cost in tons of product treated because of the increased furnace life. This became increasingly important as rates of repair labor were raised.

"A marked continuation has been going on during the past year in further improvements and developments of new products of this type; it is expected that the trend will continue at a good pace. On the other hand, some of these products were judged on the basis of figures prepared under stress and there has been a decided tendency to re-evaluate the overall economies of the use of these expensive refractories. As a result, many plants are returning to the use of more orthodox types of refractories with a resulting decrease in overall refractories costs. This trend is particularly evident in those industries where operating rates have been reduced to the most economical level and thus the load placed on the refractories has been decreased. It is felt that this change will undoubtedly continue and should be considered as a healthy determination of the proper use and selection of refractories."

Advocates Closer Control Of Fuel Consumption

MATTHEW H. MAWHINNEY

Consultant on fuels, furnaces, combustion and heat transfer, Salem, O.: "Necessity for the adjustment of human problems largely caused by technical development has slowed the application of new developments to a noticeable extent in the past year, but these same adjustments will undoubtedly renew interest in advances which lower costs in the steel industry.

"In the field of industrial furnaces, interest should be concentrated on control of fuel consumption, furnace maintenance, oxidation, and carbon content, because the potential savings under these categories are enormous and because new knowledge is available for the reduction of these losses.

"Modern instrumentation offers great possibilities but lack of incentive and understanding still limit the savings realized, and the same is true of new heat resisting alloys and refractories to improve maintenance costs.

"A bewildering knowledge of chemistry of gases in contact with hot steel has accumulated and is available to cut oxidation and carbon loss when demand develops."

Many Opportunities for Reducing Ingot Costs

H. W. POTTER

Steel consultant, Arthur G. McKee & Co., Cleveland: "Competition this year is expected to force increasing attention to the expenses of steelmaking. There are a number of opportunities for most steelmakers to reduce ingot costs. The cost of metallics for both openhearth and electric furnaces, can be reduced by taking advantage of any favorable price variance between market value of purchased ferrous materials, and actual value of these materials at a particular plant, in relation to the cost of pig iron and No. 1 heavy melting scrap. In some cases it may prove profitable to use an additional amount of iron oxide in open hearth furnaces.

"Combustion practice can be improved by relocating steam and oil mixers relative to burner discharge, and also by the further reduction of cold infiltrated air. The resulting increase in flame temperature should shorten heat time.

"A profitable means of securing added tonnage and reducing costs, is to tap consistently the largest size of heats possible under the physical limitations of the steelmaking plant. In some cases, it may be possible to reduce the thickness of ladle linings to provide a few additional tons on every heat. Some types of single use refractories may have unnecessary high quality and can be replaced with cheaper substitutes.

"Continued increase in fuel costs may improve the profitability of waste heat boilers and warrant new or modernized installations. Future economics may also justify the use of boiler feed water for cooling openhearth equipment."

MOTCH AND MERRYWEATHER MACHINERY CO. CLEVELAND, O. U.S.A.

HIGHER PRODUCTION? *Yes!*

LOWER COSTS? *Yes!* — and

ACCURACY BESIDES

with the

MOTCH & MERRYWEATHER

NO. 2-A CIRCULAR SAWING MACHINE

Triple-Chip METHOD

Triple-Chip Method cut off 490 pieces in 50 seconds per cut at a cost of $.0101 per piece.

TRIPLE-CHIP vs. ALTERNATE METHOD

(Sawing SAE 1020 5" O. D.)

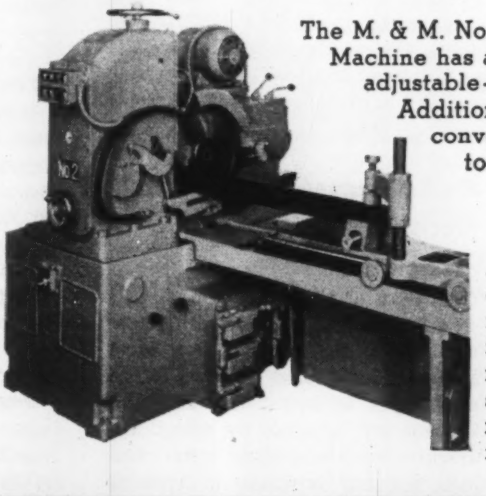
Alternate method cut off 100 pieces in 235 seconds per cut at a cost of $.0325 per piece.

As with all Motch & Merryweather Circular Sawing Machines, the No. 2-A (automatic) brings you all the advantages of the Triple-Chip Method. Stock up to 6" is sawed accurately to length without burrs, giving a mill-type finish, which eliminates second operations. Work is held rigidly on both sides of the blade. With the M. & M. Triple-Chip Saw Blade, correctly sharpened by the No. 1 Automatic Grinder, maximum cut-off speed and accuracy are attained. *Ask us to furnish you with cutting time figures.*

* * *

The M. & M. No. 2-A Circular Sawing Machine has automatic, micrometer adjustable-stop bar feed to 36". Additional stroke lengths and conveyor can be furnished to accommodate long length bars.

• • •



A complete range of circular sawing machines is available for stock up to 16½" round as well as special machines to meet your requirements.

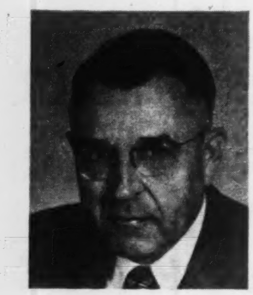
Write on your letterhead for Bulletin No. 2-S.

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING • CLEVELAND 13, OHIO

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

MACHINING

Old tools indicate industry still not at peak efficiency . . . Gage makers keep pace with demands . . . "Hot spot" machining boosts per hour production . . . Capital equipment sales to be high this year



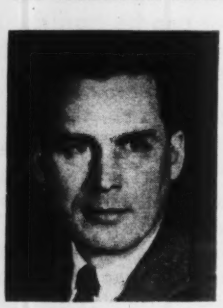
Long Stroke Openside Planer Uses Carbides Efficiently

H. B. NEWTON

President, Rockford Machine Tool Co., Rockford, Ill.: "We have introduced a new Rockford Hy-Draulic planer with cutting stroke of 33 feet. A new hydraulic cylinder assembly design, developed by our engineers, makes this long stroke possible and brings to users advantages of including time-saving set-up, because of simple, responsive hydraulic valve controls; fine finish and efficient metal removal; high speed working and return strokes and low operating cost because of faster set-up and minimum nonproductive time.

"This planer is 73 feet long overall and 14 feet high. The maximum cutting stroke of 33 feet has speeds infinitely adjustable up to a maximum suitable for carbide cutting tools. A unique feature of the machine is that speed of the return stroke may be set independent of cutting stroke speed. Thus fast return stroke speed can be used to save time, regardless of what the cutting stroke speed may be.

"This openside planer has two cross-rail heads and one side head. It has a maximum planing width for the right hand head of 60 inches, the maximum planing width, including the use of the left hand head is 72 inches and the maximum distance of the table to rail is 72 inches."



Market Expanded for Precision Band Saw

LEIGHTON WILKIE

Chairman of the board, DoAll Co., Des Plaines, Ill.: "By finding new application for the precision band saw we have been able to serve new types of industries and thus expand our market to offset the decrease in business currently experienced by other machine tools. The outlook for our business in 1950 is good.

"The 'contour saw' was first introduced as a die-making machine for tool rooms. It soon found applications in making special parts and small lots of production. During the war the contour saw principle was broadly adopted in mass production. The unique principle of the precision saw is that it slices through thick sections of any metal or material. Its low cost cutting tool cuts continuously leaving only a narrow slot and saving the material removed. Thus it is the fastest machine for removing material."

Effort-Elimination Economics Plays Important Shop Role

OTTO W. WINTER

President, Acme Winter Corp., Buffalo: "Achievements in engineering of effort-elimination equipment since World War II have been truly amazing. It can almost be said that anything can be produced automatically. What with the galaxy of electronic, hydraulic, pneumatic and mechanical devices available, only resourcefulness and ingenuity—of which there seems plenty—remain to make a most effective combination.

"It no longer is so much a question of 'can it be done' as it is a question of whether it is sound economics. I do not mean to raise a question of the economic soundness of the temporary displacement of workers to permit lower cost production of goods. That principle has long ago stood the test and found to be the only means of material progress.

"Economic soudness of automatic machinery is a function of its first cost, upkeep cost and resultant savings. Importance of its complexity is only as it relates to costs of operation or acquisition. To those experienced in design and building of cost cutting automatic machines and tooling, the analytical approach of cost versus savings is routine.

"More manufacturers should give heed to the opportunities available. Our experience is that more and more are. It still is amazing though what a gold mine of opportunity exists in most any plant we study.

"In addition to mechanizing of manual operations—and of as great importance—is elimination of material handling. Handling the work is sheer cost. Every time it is touched by hand that act should be regarded as waste of time and money.

"It is rare that we cannot show substantial savings and present a profitable equipment investment opportunity through the elimination of manual work or work handling.

"No longer should we speak of 'labor saving machinery'. That term too often in the past has been misinterpreted in a negative manner for the effect on labor. What we really are accomplishing is a humanitarian job of discarding drudgery through effort-eliminating equipment, through cost cutting conceptions that spell more and more goods for more people at lower prices."

Safety and Ease of Control Simplify Operators' Jobs

W. L. LEWIS

Vice president, International Business Machines Corp., Endicott, N. Y.: "It seems to me that our greatest progress in machine shop practice has been the result of the vast improvement which has been made in the control of machine tools. For example, automatic cycle machines have been introduced which greatly lessen the number of motions which the operator must make to bring his machine into the actual cutting cycle. Also, rapid table traverse, both to and from the work, is a real production saver.

"Greater operator safety is constantly being stressed. For example, no longer is the operator exposed in loading parts while a cutter is in operation. Safer working conditions are being designed into practically every machine tool being produced today, which is certainly a most important trend in the changing machine shop practice, and a real step in the right direction."

Broaching Extended As General Purpose Process

HARRY H. GOTBERG

Chief engineer, Colonial Broach Co., Detroit: "Drive for lower costs which is extending throughout industry—from the largest to the smallest companies—is bringing with it a widening use of the broaching process. The reason is simple: Anything that will remove metal accurately and do it faster, with fewer machine hours, is a 'natural' when you are cutting costs.

"On top of faster metal removal, mass production plants are now beginning to apply 'transfer machine' principles to broaching equipment. This is particularly true in transferring parts from broaching machines to machines performing subsequent operations, thus making manual handling of parts out of the broaching machines unnecessary. In contrast, broaching is also being extended in its application as a general purpose process—for machining both internal and external contours and surfaces. This trend in broaching has brought with it, however, a need for new types and a wider range of general purpose broaching machines.

"Smaller and medium sized plants frequently cannot justify economically—because of their shorter runs—the extreme savings made possible by high production broaching machines such as the now well-known single and dual-ram surface broaching machines, pull-up and pull-down types, etc. In most cases these machines—even though standard in design—achieve their highest economy when tooled for fairly continuous and long runs on the same operation.

"To meet the need of shops requiring machines with higher degree of flexibility in application, new types of broaching machines have now been introduced. Not only surface broaching but internal broaching, slotting and press work can be handled interchangeably on these machines, surface broaches mounted on a ram and internal broaches attached to a pusher bracket.

"An additional factor in making these machines so suitable for job-run work is their considerably lower cost. In general they are designed to sell for less than single-purpose broaching machines used for mass-production work. Some of the reduction in cost is accounted for by the lesser degree of automatization as compared with the high-production single purpose machines, eliminating considerable electrical control equipment.

"Basically however the multipurpose broaching machines operate quite similarly through motorized hydraulic pumps and hydraulic cylinders."

Modern Systems for Lapping Make Close Fits Practical

ARTHUR A. NICHOLS

Engineer, W. H. Nichols Co., Waltham, Mass.: "Processes and methods formerly classed as gage work are being applied increasingly to production work. An example of this is the use of lapping in the manufacture of pumps for aircraft uses. These pumps must operate over broad temperature ranges and at high speeds. The usual gasket arrangements between pump parts do not suffice since the gasket materials will suffer under high temperature.

"By the production of super-flat internal surfaces for the pumps, obtained by lapping, these design, production and operating problems are being met. Internal leakages are reduced to the vanishing point, and the control of running clearances in the pump vastly improved.

"Tolerances made reasonable by this gage-making technique would have been absurdly hard to attain by any other production means."

Cutting Tool Seen as Big Cost Control Factor

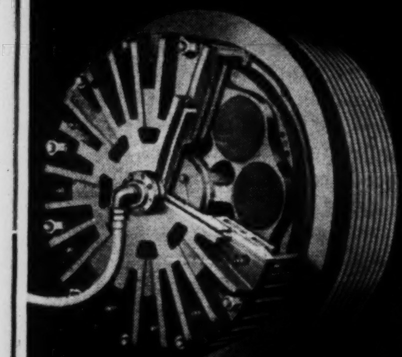
K. R. BEARDSLEE

Vice president and marketing manager, Carboloy Co. Inc., Detroit: "The powerful new drive in industry to reduce production costs has brought into prominence a control factor the possibilities of which had not been recognized except by a limited number of companies in the past. That control factor is the 'cutting tool'. General acceptance of carbide tools may be responsible in large measure for this development, due to the new concept which they brought with them of what constitutes machine and productive efficiency.

"Enormous increase in cutting speeds which these tools brought with them, focused attention inevitably on the nonproductive time of machine tools. Where machine down time for loading, for instance, had been relatively small as compared to machining time, shrinkage in machining time made the amount of down time loom much

Proving the New Danly Clutch

...in 6 months of continuous 2 shift press operation without adjustment or repair!



Cut-away view showing special method of lining mounting in the new Danly cool-running clutch. Discs of lining material are retained in a "spider" without riveting.

This 500 ton press in one of the country's leading automotive plants has run 16 hours a day for over six months . . . single stroking over 300 times every hour! During this time, the new Danly cool-running clutch hasn't even required adjustment for lining wear! Clutch maintenance, a main item of stamping cost, was virtually eliminated!

A record like this is typical of Danly clutch performance. Danly cool-running clutches are able to outwear conventional clutches consistently because they beat heat, the most destructive element of wear in press clutches.

Less heat is generated when the Danly clutch engages because ingenious design has eliminated a large proportion of the pick-up load involved in starting clutch parts. Forced air cooling dissipates what little heat there is so that the Danly cool-running clutch, under full load, operates only 35° above room temperature . . . . just barely warm!

Close-up of stamping of operation performed showing finished lower radiator grill bar. Two pieces are formed at each stroke.

CHECK THESE

EXCLUSIVE DANLY PRESS FEATURES

- ✓ cool-running clutch
- ✓ extra rigidity
- ✓ complete pressure lubrication
- ✓ special controls—sensitive reaction
- ✓ precision construction

DANLY
HEAVY-DUTY
Autofeed
PRESSES

SEND FOR THIS FREE BOOKLET

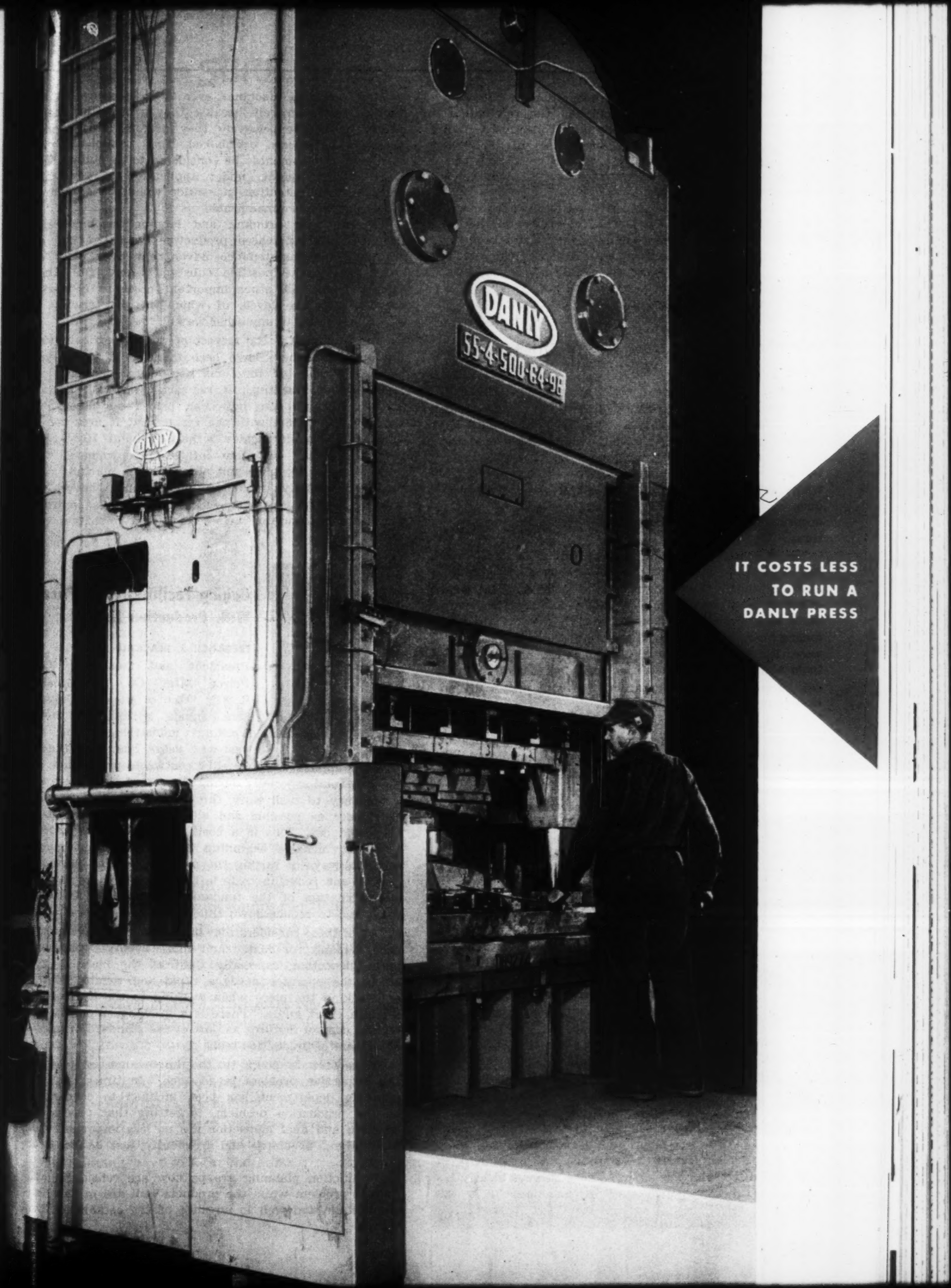
and see how DANLY PRESSES are certain to set new production records in your plant!

MECHANICAL PRESSES...50 TO 3000 TONS

DANLY

DANLY MACHINE SPECIALTIES, INC.

2100 South 52nd Avenue, Chicago 50, Illinois


DANLY
55-4-500-64-96
DANLY
IT COSTS LESS TO RUN A DANLY PRESS

larger. This brought with it a recognition of the vital influence exerted by cutting tools on the relative efficiency of machines, individually and collectively. Tool control, down time for tool changes, tool life between grinds, correct tool grinding to assure consistent performance, tool selection and application—all acquired a new importance in industry.

"In many cases this has already led to the adoption of coordinated plans of tool control, carefully tailored to meet the needs of each specific plant. These seem to have supplied an excellent answer. At least every plant which in the last few years has installed a co-ordinated tool program to our knowledge, has reported that it was instrumental in effecting major savings."

Scientific Research Speeds Up Production

ORLAN W. BOSTON

Professor of Metal Processing, University of Michigan, Ann Arbor, Mich.: "One of the outstanding achievements made manifest by practice in the large manufacturing plants during the last year is the increased use of the transfer machines. These machines automatically transfer the work from one machine to another through a whole series of operations on a single part. They produce more uniform quality of parts and lead to greater accuracy because of the accurate built-in locating features.

"In the past down time of these machines for changing broken or dull tools has been excessive. Through more scientific knowledge of the selection, treating, grinding and application of the tools, together with more appropriate speeds and feeds, these tools are producing more per tool grind with uniformity in performance. Further development in application of location of tools and tool holders has been made so that worn tools can be replaced in a very short time with practically no change in dimensions of the work.

"Results of scientific research in laboratories and in practice are reaching production lines. This applies to the conditioning of the metal being machined and the type and application of cutting fluids as well as to the cutting tools themselves.

"During the year many sessions of technical societies have been devoted to reports on basic facts relating to the performance of tools, cutting fluids and materials cut. The machine designer has taken advantage of this scientific information in designing his machines for maximum production both from a power point of view and the endurance of tools, uniformity of surface finish and the reduction of direct labor which leads to lower final cost."

Over-Age Grinding Machines Don't Pull Their Own Weight

C. DENSON DAY

Sales Manager, Grinding Machine Division, Norton Co., Worcester, Mass.: "Recent equipment surveys of major industries show that there is an acute need for development and use of a formula that will show dollar return possibilities on investment in new metal working machinery. These surveys clearly indicate top heavy percentages of machines 10 to 20 years old.

"Many grinding machines, even 20 to 30 years old, are kept in service merely because they grind. How inefficiently or how expensively they perform this service, seems to have been overlooked. They cannot—in view of recent developments—be considered to be pulling their share of the weight; under application of a suitable formula, their retention in service would be recognized by management as inadvisable.

"Because new grinding and lapping machines now available offer increased productive capacities and operational and maintenance advantages over older designs, they make possible substantial savings. These savings cancel-out other important costs to a marked degree—costs the levels of which are not readily, or easily, controlled in any other way.

"For example, in the newest of our cylindrical grinding machines, there have been transferred to the machine a number of functions heretofore manually performed—thus resulting in reduced direct labor costs. Strong emphasis also has been placed on 'mechanization' of fine sizing, with the result that it now can be much more rapidly achieved than by hand. Here again labor costs are definitely influenced downward. Last but not least grouping and placement of machine components normally requiring maintenance have been worked out to give easy accessibility. This improved serviceability condition offers additional important savings.

Gaging Facilities Keep Pace With Production Lines

FREDERICK S. BLACKALL JR.

President and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I.: "One of the most significant trends within the metalworking industries during the post-war years has been the increasing application of quality control to production. In the past, and especially during the recent war, there was a tendency to rush work through machining operations as rapidly as possible and allow defective work to be 'inspected out'. This is a costly and dangerous process.

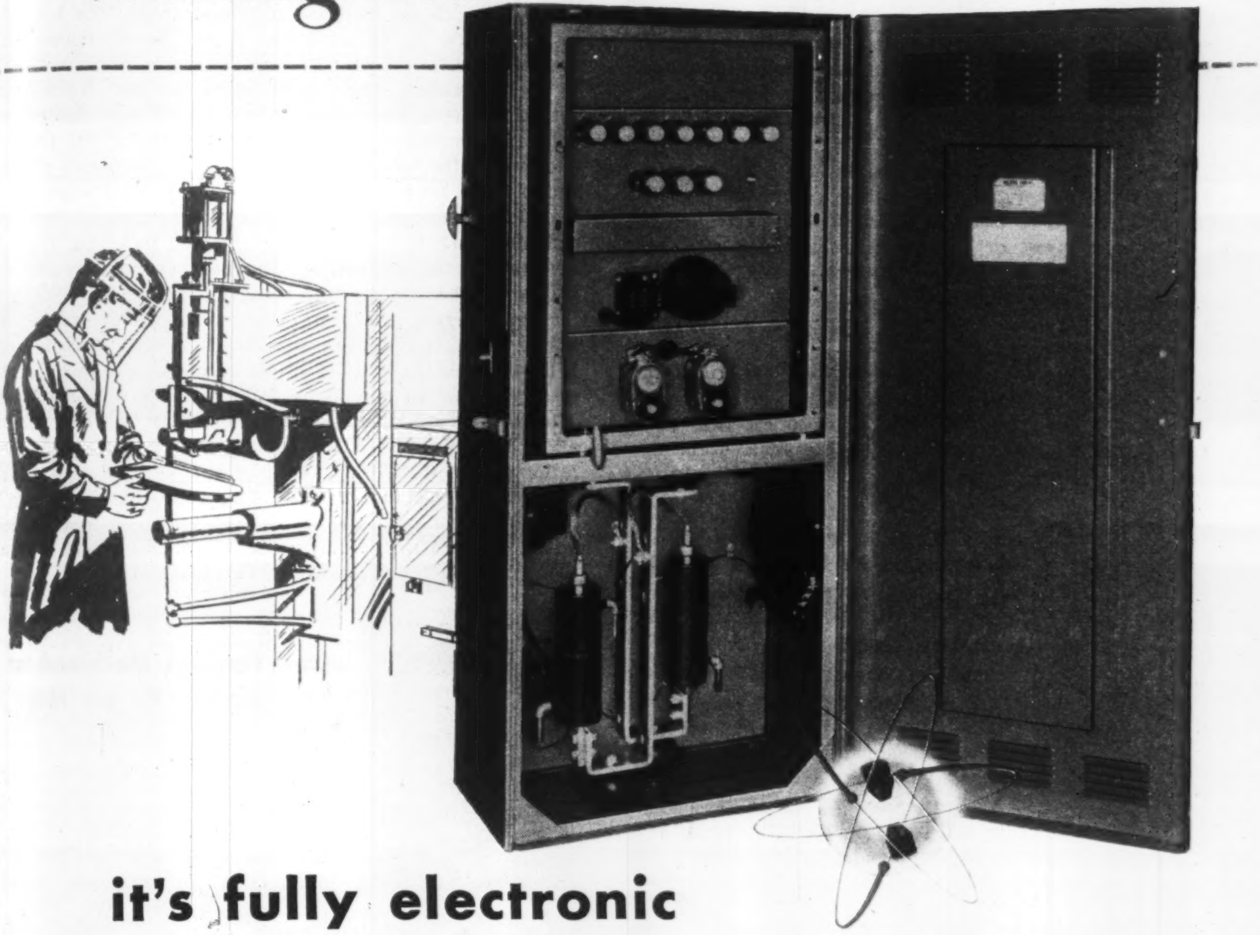
"Management is beginning to recognize that one of the best ways of raising the production rate, improving quality and reducing costs is to minimize the scrap pile by elimination of the fundamental causes of defective work and to reduce down time on machine operations.

"All of these considerations unquestionably have heightened demand for faster and more accurate means of parts inspection, especially right at the machine tool, where the operator needs a rapid and reliable method of checking the piece when working to the control limits of a chart guide. There is a growing emphasis, too, on size control features as part of the standard or special equipment of production tools.

"These trends point to the importance of planning the inspection problem in advance. In times past, the planning department has been inclined to concentrate on the production problem, forgetting that process inspection and final inspection are no less important than the making of chips—and frequently just as time-consuming.

"Production planning groups now are considering the gaging problem while the products still are in the blueprint stage and well in advance of the established pro-

YOU CAN BE SURE.. IF IT'S Westinghouse



it's fully electronic

. . . to hold weld quality up . . . costs down!

The control of a resistance welding machine is a grueling job made easy by the new Westinghouse Control. For example, it calls for the making and breaking of high amperage circuits with machine gun frequency. Each weld depends on many timing functions, which must be achieved with repetitive accuracy.

In the new Westinghouse Resistance Welding Control this big job is handled by tireless electronic tubes. The result is a design in which virtually all moving parts have been eliminated. This gives you important advantages on the welding assembly line. Better assembly quality, for one thing, because complete electronic sequencing assures a degree of *precision unattainable with mechanical or only partially electronic controls.*

On spot-welded parts, for example, rhythmic timing produces welds that are strong and evenly spaced and the desired uniformity is easily attained since the operator doesn't have to fight the gun.

Consistently good weld quality means fewer rejects . . . more output, for less. Easing the operator's job also steps up weld production by permitting faster handling of the work.

Get the complete story on this new cost-saving control in booklet B-4309. Address Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-21536

Westinghouse

RESISTANCE WELDING CONTROL

duction schedules. It is a wholesome trend.

"Process sheets more and more are specifying inspection equipment of air gage type as a rapid and convenient means of precision inspection. It is fast, precise, and being relatively foolproof, can be entrusted to the inexperienced operator with only the most cursory instruction. Being portable, it is ideally suited to floor inspection operations, where it can be set up with only a simple air line connection right at the machine. Extension air tube attachments make it readily adaptable to use for checking otherwise inaccessible measuring points.

"The air gage lends itself with equal facility to bench inspection procedures, or to special built-in applications on the machine itself. And its almost exclusive ability among gaging instruments to check size without actual work contact eliminates danger of scoring or scratching highly finished surfaces.

"Advance of the air gage to the front rank among precision gaging instruments is a significant development. Its almost universal applicability, both to internal and external inspection, justifies favorable consideration by management seeking lower costs and improved quality."

Economic Law Sets the Limits On Degree of Mechanization

ROBERT L. GIEBEL

President, Giebel Inc., New York: "It is interesting to watch the fads which become popular in machine shops. While they are not seasonable, they are quite distinct. As an example, for quite some time both manufacturers and users of machine tools have been 'profile' minded. Parts are being duplicated on lathes, millers, planers and grinders by copying a master template. This method appeals to the user because it reduces the physical and mental efforts of both the set-up men and the operators.

"Quite often it improves the quality and reduces the cost, if parts are put through the shop in small lots. A complicated electrical or hydraulic mechanism is built into the machines which means larger initial investment and costly maintenance.

"Eventually, the limitations of profile operations will be determined and then certain practices will be accepted as standard while many others, which now look inviting, will be eliminated."

"Hot Spot" Machining Boosts Per Hour Production

SAM TOUR

General manager, Sam Tour & Co. Inc., New York: "Hot spot machining may prove to be one of the most important developments for machining of metals. Research work on 'hot spot' cutting, sponsored by the U. S. Navy was carried out in our laboratories. It involves the elimination of coolants on the cutting point and the application of heat just ahead of the tool. As rapidly as the area ahead of the tool is heated and before the heat has penetrated to great depth in the work the heated metal is cut away by the tool.

"Power required in metal cutting is consumed in shearing the metal, in deforming the chip and in friction against the tool surface. The shear strength of metals decreases with an increase of temperature. The hardness or resistance to deformation of metals decreases with temperature.

"By increasing the temperature of the work being cut, the forces necessary to shear off and deform the chip are decreased. Pressure at the point of the tool and friction on the tool is decreased. These decreases in pressure and in friction decrease tool wear. Tool edge breakage due to excessive pressures is eliminated. Cemented tungsten carbide tools are not affected by either the heat involved in the perheating, the heat evolved by the cutting or the heat in the chip being formed.

"Low carbon, medium carbon, chromium, nickel and nickel steels have been machined by this technique at 3 to 4 times the rate of metal removal per minute than was possible on the same lathe at room temperatures. The high temperature cobalt chromium jet and turbine alloy known as S816 has been turned in a 5-horsepower lathe with a 0.187-inch depth of cut, a 0.015-inch feed at 134 surface feet per minute. This represents a metal removal rate of over 100 times that which is attainable at room temperature. Stainless steel and as-rolled K Monel metal are machined readily by this method."

Steel Forgings Machined at 1185 Surface Ft. per Min.

WALTER J. GRIMM

Secretary and assistant to general manager, Jones & Lamson Machine Co., Springfield, Vt.: "In the year 1949 numerous previously announced propositions received finishing touches. We built one machine in particular which created a great deal of comment. This is a 16-in. Fay automatic lathe equipped with 'sequential control' and arranged to turn stem pinions and similar parts at extremely high production rates.

"Work is delivered to the machine milled to uniform lengths and centered at both ends. Operation of the machine on a forged automotive drive pinion consists of placing the work on a cradle between the headstock and tailstock centers. Tailstock is equipped with a hydraulically operated ram which, as it advances toward the headstock, picks up the part and shoves it onto the headstock center. The ram continues its stroke, indenting a driver with five 90° included angle serrations into the gear end of the work, thus eliminating necessity for any other driving mechanism.

"After the driver is imbedded into the work, pressure on the tailstock is released to normal in order to give ample driving capacity. The sequential hydraulic mechanism then binds the tailstock ram to a predetermined degree to remove looseness and yet permit center follow-up if necessary. Sliding panel in the transparent guard is then closed and the spindle starts revolving.

"Because of the high speed and large amount of chip removal (⅜-in. on a side maximum) generous flow of coolant is necessary. Therefore the machine is completely guarded, including a hood enclosure fitted with sections of transparent plastic. Wide pan affords ample chip space. Chip removal is easy—it is possible to remove them while the machine is running."

"All the operator has to do is remove the finished piece, place a rough forging on the loading cradle and then push a single button which initiates all of the operating functions. The part is machined complete with carbide tooling, using 66 horsepower, in 8½ seconds cutting time and floor-to-floor time of 17 seconds. Typical stem pinion setup involves six tools on the carriage and seven tools on the back arm. The job runs at 1,200 rpm or 1185 surface feet per min, 0.012-in. feed per revolution on facing and 0.0148-in. on turning cuts. The whole cycle affords an excellent example of possibilities for reducing physical fatigue through engineered application of electrics and hydraulics."

Fast Station-Type Machines Have Palletized Fixtures

RALPH E. CROSS

Executive vice president & secretary, Cross Co., Detroit: "Our palletized transfer machine, or Transfer Matic as we prefer to call it, is giving new concepts to processing of many irregular shaped small and medium sized parts. In this type of machine the work piece is clamped in a palletized fixture which is transferred through a number of machining stations and then automatically conveyed back to the operator's station for loading and unloading.

"When castings or forgings are properly equipped with locating spots in the foundry or forge shop they usually can be machined complete with one handling and without any preparatory operations often required with other types of transfer equipment. Manifolds, clutch housings, bearing caps and pump bodies are some of the typical parts being processed in this way.

"Carbide drilling is rapidly approaching the point where it will be marketable. This is necessitating new developments in multiple head construction and likewise in the feed units used to power the heads. Drill bushing design is also going through some changes to accommodate the new higher carbide cutting speeds.

"Another new development soon to be announced is the Cross Toolometer which is an automatic device for turning off a machine tool when one or more of the tools require sharpening."

Pantograph Milling Machine Does Effective Cam Cutting

GEORGE HABICHT JR.

President and treasurer, Marshall & Huschart Machinery Co., Chicago: "Here is some information on a new process for generating an original cam and the making of identical cams. There are many shops which have to produce cams of this type, but which do not have sufficient of this work to use highly specialized equipment. My discussion treats with this sort of a job performed on a Gorton 3S Pantograph Machine, a fairly low priced piece of equipment.

"I will not attempt to explain it in detail, but will merely outline the steps necessary, which are as follows: Step No. 1. From an engineering print an enlarged layout of the cam is made on specially prepared Vinolite material. This layout is five times larger than the required cam size and it now acts like a negative, as all lines are transparent.

"Step No. 2 The vinolite negative is now transposed onto a piece 1/16-inch thick steel plate that has the top surface sensitized. This is then developed. Step No. 3. It is now an easy matter with the use of a metal band saw and file to produce a very accurate and large cam. Step No. 4. The large model cam is clamped to the copyholder table of a Gorton 3S Pantograph and a piece of ground stock the thickness of the finished cam is mounted in the workholding fixture directly under the cutting spindle.

"Step No. 5. The cam is now machined with a special six-flute end mill which is revolved at 750 rpm. The operator lowers the cutter into the piece part only 0.002 to 0.003 and then follows around the master cam, producing a shallow outline of the piece part. The piece is now removed from the fixture and sawed to 1/32-inch of actual size. After sawing it out, it is placed on the workholding fixture and profiled to size. Two cuts are made for this finishing operation. The first, a roughing cut, allowing 0.003 for finishing and the second operation, finishing to size.

"Time saving in this method over other methods previously employed, as stated by one of the shops who is using the above method, amounts to the difference between one hour and 120 hours."

Steel Mill Rolls Are Turned On Tracer Controlled Lathes

JEROME A. RATERMAN

President, Monarch Machine Tool Co., Sidney, O.: "Today ability of a new machine to pay for itself in short order—say as little as 12 to 18 months frequently is the deciding factor in whether such a capital investment will be made or indefinitely postponed. Such a policy may be criticized as showing lack of industrial statesmanship or undue concern for the stockholders' 'security'. Nevertheless, the fact remains that a number of company managements do appear to be as much or more concerned with conserving assets as with adding to them.

"This presents a challenge to machine tool builders which, while severe, has not been without some interesting results. This has been particularly true in the field of engine lathes, where designers have teamed tracer-equipped turning machines with single point tooling to achieve unbelievably big slashes in the machining time on many kinds of work.

"For example some of our new lathes equipped with the air gage tracer have cut machining time on aircraft engine mounts by 200 per cent; on rotary grinder casings by 300 per cent; on a nine foot shaft by 350 per cent. Another Motor-trace tracer controlled lathe has cut machining time on a 51 in. motor shaft from 55 to 12 min.

"Even more startling cuts in maching time and cost have been made in application of a tracer controlled engine lathe to turning of steel mill rolls. In this instance improvements in carbide tools have been combined with further refinements in Kellar electrical contouring controls to produce a machine which in repeated tests has demonstrated it can cut by two-thirds or more the present machining time on even the toughest chilled cast iron rolls. So substantial is this saving that for many mills it is a foregone conclusion that the new lathe can easily pay for itself in a year or less.

"One of the ten steel roll turning lathes so far completed has been shipped abroad. Even with the lower labor rates prevailing there it is expected to pay its way seval time over. There may be food for thought of all of us in the fact that, while these European countries have severely restricted their purchases of standard American machine tools, they have continued to buy our special machines.

"They are not buying standard tools because these can and are being built abroad. But the extent of their purchases of special machines has been substantial enough to raise the question as to whether some European production men haven't been as quick or quicker than their American counterparts to seek advantages inherent in new equipment which, even where it cannot be written off in one or two years, will cut costs so substantially as to re-establish their purchasers as first-rate competitors."

Basically New Machine Tools Are Rare Inventions Today

LUCIEN I. YEOMANS

Lucien I. Yeomans Inc., Industrial Engineers, Chicago: "I am impressed by the fact that almost all improved facilities now are highly specialized and limited in performance to very specific purposes. It is due to the trend of the times toward permissible minute refinements in process consequent upon modern mass production. The times when new basic tools of the industry, such as the steam hammer, planer, boring mill, engine lathe, punch press, etc., appeared are behind us—with a few possible exceptions.

"One such entirely new type of machine tool within recent years has been introduced and accepted in the trade as capable of filling a long felt want. It is of prime consequence because its principal use is for producing jig and fixture work with great accuracy and with a tremendous saving in our highest rated skilled labor, finishing both the plane surfaces and the bushing locations in such work at single settings.

"This new type of machine tool has been quite appropriately designated, and become generally known, as a jigmil and is entirely a development of the present decade, the fundamental or prototype machine being exemplified in the 1941 patent to Lucas and Stephen, and a considerably improved machine in the 1945 patent to De Vlieg having a very wide distribution."

Old Tools Indicate Industry Still Not at Peak Efficiency

RALPH J. KRAUT

President, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., president, Cincinnati Planer Co., Cincinnati: "I was dumbfounded to learn recently that today slightly more than 58 per cent of the machine tools of the types manufactured by Giddings & Lewis and Cincinnati Planer are more than 10 years old. This includes horizontal boring, drilling and milling machines at 48 per cent; vertical boring mills at 54 per cent; planer millers at 60 per cent; and planers at 76 per cent. Obviously, this means that a disturbingly large majority of these tools are of prewar design and manufacture and that industry is not taking full advantage of the many new machining methods and practices learned during the war and postwar periods.

"In saying this I realize fully the discouraging and dampening effects resulting from our government's obsolete policy of allowing inadequate straight line depreciation rates, usually less than 6 per cent per year. Here is a situation that we should all urge our congressmen to correct without delay. Notwithstanding, industrial executives can ill afford to pass up the many fundamental changes and improvements in machine tools since the war. Among these refinements are: Increased horsepowers; higher speeds and feeds and greater rigidities for the use of carbides to increase production; simpler and better components such as gears, clutches and bearings to increase accuracies; quick-change tooling, automatic and semi-automatic positioning, measuring and contouring devices and centralized controls to bring out maximum efficiency of machine operators; and simplification and improvement of designs to reduce maintenance and protect operators.

"You can't meet the competition of tomorrow with the machine tools of yesterday."

Lathes Still Our Basic Tools And We Keep Improving Them

B. N. BROCKMAN

Vice president and sales manager, R. K. LeBlond Machine Tool Co., Cincinnati: "We are having a sales meeting here Jan. 10 and 11, 1950, to display to our distributor organization five new machines and two others with basic design refinements. To meet current demand for higher speeds, more speeds and increased horsepower, these lathes carry all of these features plus totally enclosed feed boxes, hard steel ways and simplified controls.

"This business was founded on engine lathes some 65 years ago. While our automatic crankshaft turning has made great strides in the past 10 years, still the continuing demand for regular engine lathes of heavy duty, toolroom and the light types, keep us constantly on the alert. After all, the lathe is the basic shop tool.

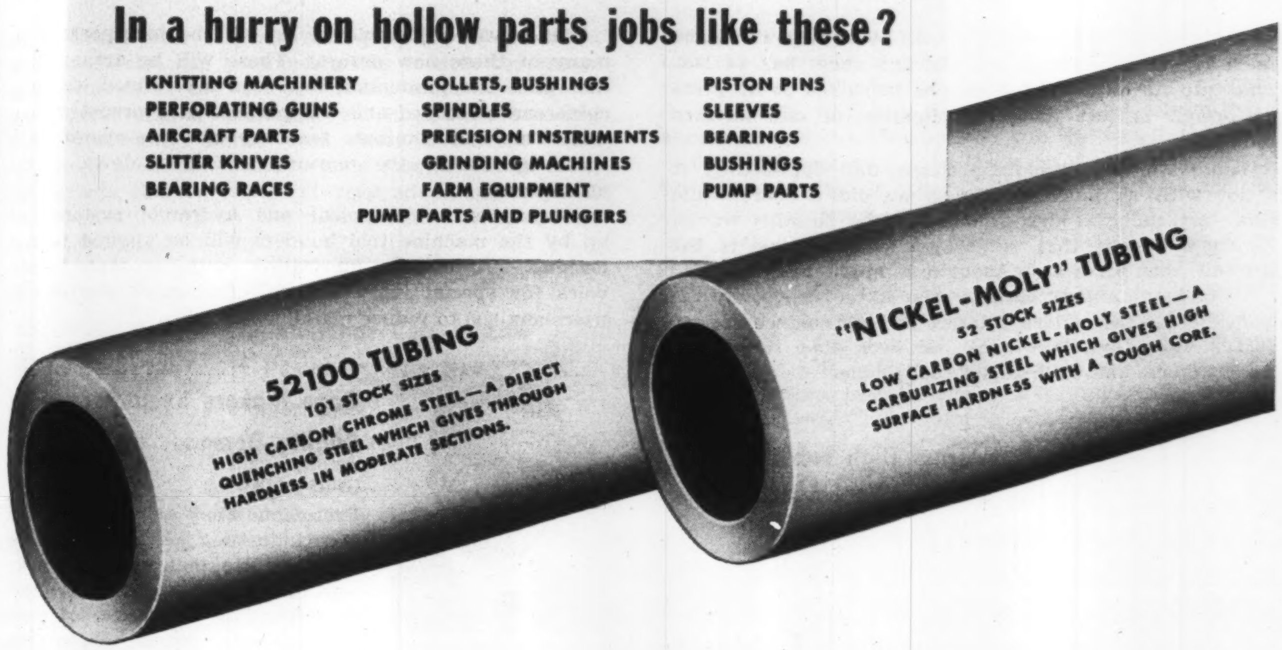
"Electrical controls in many cases seem to be a necessity and we supply them on our variable voltage drive. However, we are beginning to get reactions to the upkeep angle. These lead to the belief that the pendulum is swinging toward an increased number of mechanical speeds such as we are incorporating in our new designs.

"In adjusting our thinking to these high speeds, we were confronted with problems of chips and feeds. In cases of forging and castings, the problem of flying materials calls for totally enclosed quick change boxes of heavier design. These are automatically lubricated from oil reservoirs carried in the bed from which, through filters, oil also is distributed to the head. To make it still easier from the operator's angle, we have included automatic leadscrew and feed rod supports on a dovetail in back of the rods. In some of our new models we have incorporated electric brakes.

"Now with the high interest in increased surface

In a hurry on hollow parts jobs like these?

KNITTING MACHINERY
PERFORATING GUNS
AIRCRAFT PARTS
SLITTER KNIVES
BEARING RACES
COLLETS, BUSHINGS
SPINDLES
PRECISION INSTRUMENTS
GRINDING MACHINES
FARM EQUIPMENT
PISTON PINS
SLEEVES
BEARINGS
BUSHINGS
PUMP PARTS
PUMP PARTS AND PLUNGERS


52100 TUBING
101 STOCK SIZES
HIGH CARBON CHROME STEEL—A DIRECT QUENCHING STEEL WHICH GIVES THROUGH HARDNESS IN MODERATE SECTIONS.
"NICKEL-MOLY" TUBING
52 STOCK SIZES
LOW CARBON NICKEL-MOLY STEEL—A CARBURIZING STEEL WHICH GIVES HIGH SURFACE HARDNESS WITH A TOUGH CORE.

These 2 TIMKEN® wear-resistant steels shipped in 24 hours!

YOU CAN GET DELIVERY NOW FROM WAREHOUSE STOCK!

TIMKEN® 52100 and Timken "Nickel-moly"–general purpose steels with good hardenability and wear resistance — will do 90% of your hollow parts jobs. And they're available in small quantities for immediate delivery within 24 hours of receipt of your order!

Timken 52100 is ideal for such machined parts as diesel injection pump parts, lathe centers, slitting knives and many other applications. It can be heat treated to file hardness and tempered back to any desired point. In moderate sections it is through-hardening. 52100 is available in 101 sizes, from 1″ to 10½″ O. D.

Timken "Nickel-moly" provides exceptional stamina and shock absorbent qualities. It is a low carbon, carburizing steel that develops high case hardness and tough inner core. 52 sizes range from 1.389″ to 10.223″ O. D.

You're assured of uniformity from tube to tube and shipment to shipment by careful quality control from melting through final tube inspection. For stock lists, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

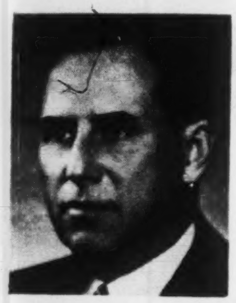
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

TIMKEN
TRADE-MARK REG. U.S. PAT. OFF.
Fine Alloy
STEEL
and Seamless Tubes

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing speeds, the full automatic 12 inch, 50 horsepower lathe which we introduced at the Chicago show has at last come into its own. That it can be marketed in its present design is just another indication of our forward thinking.

"While we are promoting single tool duplicating, it is not with as much fervor as we did a short while back—especially on high production jobs. In other words, we don't believe that single point duplicating is the 'cure-all' that some have thought it might be.

"I don't think that carbide men have been solely responsible for the sudden interest in high surface speeds. Rather, this promotion work has been done largely by the customers and the machine tool people."

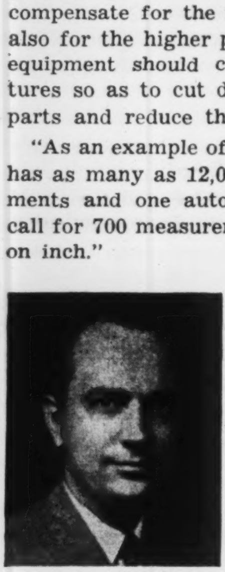


Counteract High Labor Costs By Machine Tool Efficiency

KIRKE W. CONNOR

President, Micromatic Hone Corp., Detroit: "It is my opinion that the next general move for technical progress in metal working for American industry should be of such a nature as will meet the following specifications: 1. Semi-automatic and automatic equipment should be of such a character as will set the pace of production for the operator. This will tend to compensate for the inefficiency of present day labor and also for the higher prevailing labor rates. 2. Machine tool equipment should comprise automatic size control features so as to cut down a selective fitting of component parts and reduce the high cost of inspection operations.

"As an example of the cost of gaging, one manufacturer has as many as 12,000 applications of precision measurements and one automobile manufacturer's specifications call for 700 measurements per car within a thousandths of on inch."



Automatic Handling of Work Is Next Thing on the Agenda

M. A. HOLLENGREEN

President and general manager, Landis Tool Co., Waynesboro, Pa.: "The era of new designs in machines aimed at a maximum rate of metal removal has just about reached its top level. From now on, concentration will have to be along lines aimed at facilitating handling of work pieces, both in and out of the machine, and eventually will mean automatic loading and unloading devices.

"The decade just past saw great strides in developing metalworking machines which could efficiently handle alloy steel and produce excellent finishes. These designs will be improved but there probably will be few sensational gains in metal removal rates or in finishes obtained. Instead, the new machine tools will have built-in mechanisms which will ease the burden of loading many of the parts now found in production shops.

"In line with this will be means for quickly and accurately locating the tool to the work piece or vice-versa. Finally, there will evolve fully automatic loading mechanisms to eliminate the human factor and make it possible to watch over more than one machine.

"Automatic adjustable cycles will be incorporated on many of these new designs. These will be arranged so that once the production has been determined, the machine can be locked and will produce at a predetermined rate. This will eliminate tendency of some operators to speed up during the morning and slow down in the afternoon.

"Standards for electrical and hydraulic systems set up by the machine tool builders will be applied to new designs. Automatic lubrication with separate reservoirs for special lubricants will find more demand by users anxious to reduce maintenance costs."

Gage Makers Keep Pace with Quality Demands on Industry

LOUIS POLK

President, Sheffield Co., Dayton, O.: "Industries in the metalworking field are making rapid progress in accurately and economically controlling dimension of parts and products. At the same time, rate of productivity is being increased as new ideas and devices to accomplish these results are welcomed by industry. This has been accomplished by two methods which are far in advance of standard practices just a few short years ago.

"The plan being most widely adopted by concerns of all sizes is the gaging of parts by the operator right at the machine during production. This assures a maximum of units that fit and are completely interchangeable, while practically eliminating waste and rejection at the machine and during assembly. The other method is the growing use of fully automatic and semiautomatic gaging, segregating and classifying machines for large volume production items.

"Air gaging and combinations of air and electric gages have led the way in the new developments. Although requirements of industry are steadily reaching higher peaks of precision, manufacturers of gage and precision instruments are keeping pace with the demand by providing new machines, better methods, and improvements in design and function. In many cases they create special machines and devices that do almost unbelievable things in mass production gaging and inspection with substantial reduction in unit costs."

Interest in Tungsten Carbide Chasers Increases

GRAYSON M. STICKELL

Vice president, Landis Machine Co., Waynesboro, Pa.: "In our opinion the machine tool buyer is more conscious of production costs today than ever before. Whether costs are reduced by combining more operations in one set-up, through the use of more fully automatic machines or by using higher cutting speeds seems to make no difference whatsoever, so long as production per man hour is increased. This trend unquestionably will be accelerated by devaluation of many foreign currencies. Devaluation ultimately will have the effect of restricting trade unless the American manufacturer is willing either to forego profits on export business or is able to reduce costs and selling prices to the point where he can maintain his position in world markets.

"We have noticed the very decided increase in inquiries for our automatic and semi-automatic threading machines and for our automatic nipple threading machine. It also has been interesting to note the exceptional interest in the use of chasers made of tungsten carbide and similar materials which permit threading speeds materially higher than those obtainable from high speed steel. There are certain jobs on which tungsten carbide chasers work out very advantageously but their application up to the present time certainly can not be considered universal."

Maintenance Cost Is Low If Designers Pay Heed to It

J. H. BEARDSLEY

General manager, Bryant Chucking Grinder Co., Springfield, Vt.: "Machine design like any other design is not a static science. If it were, one design would serve indefinitely. Machine design is effected by a number of elements and as the value of these individual elements changes, the overall design must be altered to accommodate the new requirements.

"Machine tool buyers have become more and more aware of the high maintenance costs which are inherent in highly specialized and complex mechanisms. The importance of maintenance costs, as they effect machine design, has grown to such an extent that we have designed our latest automatic internal grinder so that it can be maintained by a mechanic. It does not require the personal attention of a highly trained electrician or hydraulics expert.

"It is designed so that should something get out of adjustment, the trouble can be found and fixed quickly. When downtime is figured in dollars-per-minute it shows how serious it is when the machine has to wait for a specialist to fix it.

"We feel that this is in line with the present trend to reduce costs not only in the selling price of the machine but in actual cash savings to the purchaser after the machine is in operation."

Rapid Expansion Is Apparent In Use of Coated Abrasives

FRANK J. TONE JR.

Vice president, Carborundum Co., Niagara Falls, N. Y.: "Automotive industry gave to abrasive industry and machine tool industry their greatest impetus in the early 1900's, resulting in the mass production era. Precision, interchangeability of parts, new and improved surface finishes set new standards of precision and were accomplished through the expanded use of abrasives and abrasive machine equipment. This trend was greatly accentuated during the late war, particularly in the automotive and aviation industries.

"So rapid was the development that the rate of obsolescence of past abrasive technology and abrasive machine equipment was sharply accelerated. New materials requiring machining and forming operations, new forms required by modern or new functional design will further accentuate this trend in the future.

"Industry in general has not been able to digest, correlate or reduce to practice all the technical knowledge, abrasively or otherwise, presently possessed. Correlation and reduction to practice of our existing knowledge and existing new bonded and coated abrasive product developments will open new and expanded markets for abrasives and machine equipments on which they are utilized. We are well into the age of precision, and a further extension of the techniques developed in the automotive, aviation, and steel industries are expanding into every segment of American industry where they can be applied.

"New abrasive tools will be designed to accomplish a reduction in man machine hours per unit and increase productivity. This may be accomplished through structural changes in grinding wheels and bond types having greater mechanical strength to withstand higher operating speeds. This trend is indicated by recent developments of reinforced fabric wheels known as 'Carborundum MX products' which are capable of withstanding these higher speeds.

"As new equipment is developed and machines now in the field are equipped with proper safety guards, trend will be toward higher rotative speeds. This will result in substitution of abrasive products for some other metal cutting methods now in use."

Heating of Metal Being Cut Reduces Power Requirements

FRANCIS J. TRECKER

President, Kearney & Trecker Corp., Milwaukee: "From 1940 until the present time tremendous developments have taken place in the art of metal working. The war itself occasioned many technical advances which were given impetus by the very stress of the emergency itself. Large sums of money were available to speed up the normal development of many processes which otherwise would have lagged for years. Of course the foremost example of this is the development of atomic energy.

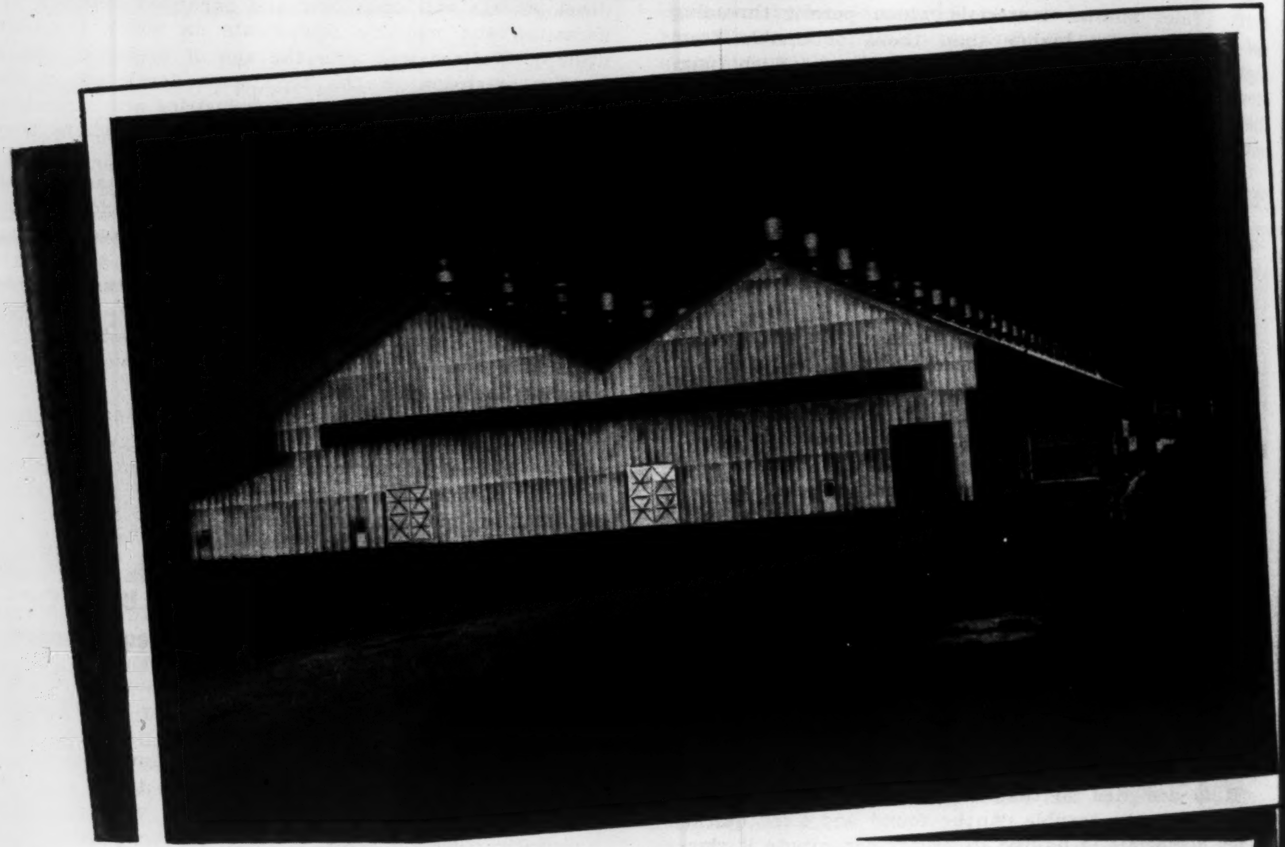
"In the machining of metals many strides were made under the duress and pressure of production, in particular, the machining of metals which had a military application but which were not customarily used in civilian application. Through the working of these metals the machine tool industry was able to gather knowledge and speed up the application of improved metal working principles.

"In particular, the trend has been to more and more horsepower input into the machine operation, resulting in both greater productivity and working of metals which formerly were not feasible due, principally, because of power and design of the metal working tool itself.

"In the last year the hot machining of metals has made considerable strides. It is entirely reasonable to assume that metal removing is nothing but the application of heat and energy. The amount of input horsepower applied to the cutting tool is reduced by heating of the metal to be machined.

"Undoubtedly other countries besides the United States —Germany in particular—have also made considerable strides in the metalworking field. Some of these advancements are beginning to seep through to this country. Since the war German industries have not publicized their developments, due to their inability to obtain international patent protection. At some time in

NOW OPERATING—A.W.'s



Products of ALAN WOOD STEEL COMPANY

IRON PRODUCTS

"SWEDE" PIG IRON

Foundry, Malleable, Bessemer and Basic

STEEL PRODUCTS

BILLETS—BLOOMS—SLABS

Forging and Re-rolling Qualities
Furnished in carbon, copper or alloy analyses

PLATES (SHEARED)

Tank, Ship, Boiler, Flange, Firebox, Locomotive Firebox, Structural, Dredge Pipe and Abrasion-Resistant Qualities
Furnished in carbon, copper or alloy analyses
A.W. Dynalloy (High Strength Plates)

HOT ROLLED SHEETS

Special qualities in carbon, copper or alloy analyses
A.W. Dynalloy (High Strength Sheets)

HOT ROLLED STRIP

Coiled and cut lengths
Carbon, copper or alloy analyses
A.W. Dynalloy (High Strength Strip)

A.W. ROLLED STEEL FLOOR PLATES

A.W. Algrip Abrasive
A.W. Super-Diamond Pattern
A.W. Diamondette Pattern
A.W. Sunken Diamond Pattern
A.W. Ribbed Pattern

STAINLESS-CLAD STEEL

Permaclad Sheets and Strip
Standard and special qualities available in desired finishes

A.W. CUT NAILS

Reading Brand
Black, Quenched and Tempered, Galvanized

MINE PRODUCTS

Iron Ore Concentrates
Sintered Concentrates, Crushed Stone, Grit, Sand and Engine Sand

COKE

Foundry, Industrial and Domestic

COAL CHEMICALS

Coke Oven Gas • Crude Coal Tar
Ammonium Sulphate • Industrial Benzol, Toluol, Xylol • Motor Benzol
Crude Solvent Naphtha • Crude Naphthalene • Crude Tar Bases
Sodium Phenolate • Crude Light Oil
Still Residue.

If it's Alan Wood—it's good

ALAN WOOD

CONSHOHOCKEN, PENNSYLVANIA

District Offices and Representatives: ATLANTA, BOSTON, BUFFALO, CINCINNATI, CLEVELAND, DETROIT, HOUSTON, LOS ANGELES

NEW STRIP MILL

Photo taken during last stages of construction.

Here's good news for strip users . . . hot rolled strip is now coming out of our new 30 inch mill at Ivy Rock, Pennsylvania. This mill is the latest link in our chain of production and control extending all the way from the mine to you—another example of the progressive expansion of Alan Wood Steel Company to serve you better. Take advantage of this new source of supply. Put your problems in alloy or carbon steel up to our Metallurgical Department. Your inquiry will receive their prompt attention.

STEEL COMPANY

IVY ROCK, PA.   SWEDELAND, PA.   DOVER, N.J.   OXFORD, N.J.

NEW YORK, PHILADELPHIA, PITTSBURGH, RICHMOND, SAN FRANCISCO, ST. PAUL, SEATTLE

Montreal and Toronto, Canada: ***A. C. Leslie & Co.***

the future I believe a considerable fund of knowledge will be made available from this source."

Stage Set for Replacement Of Obsolete Machine Tools

WALTER S. PRAEG

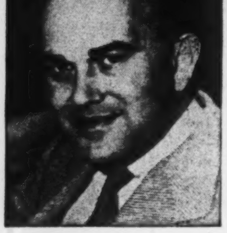
President, National Broach & Machine Co., Detroit: "It is difficult to indulge in that wide spread pessimism that seems to have infected so many machine tool builders' organizations. True, the lush days of the recent seller's market are over but that is by no means a catastrophy. It's a challenge.

"Labor costs are at an all time high and we can't expect any immediate reduction in wage rates. Material costs reflecting current wage rates are likewise high and will probably remain so. The only remaining approach to a solution of the economic squeeze is through new, better, more efficient production methods.

"The machine can meet the present economic challenge. It can assume a greater and greater portion of the production function. The machine can be designed to require less and less human ability, human effort and human time to operate. Better machines can and are making it possible to turn out better products at less cost, in spite of high wages. Never has the need for imagination, ideas and initiative in machine tool development been as imperative as it is right now.

"And never have old machines been so utterly obsolete as they are today. As an instance with which I am very familiar, the gear shaving machine of today is from 300 to 500 per cent more productive than its prewar predecessor. Product tolerances with these present machines are fantastically small compared with accepted standards of five or six years ago. Naturally, prewar machines cannot compete with those of today.

"The one obstacle to universal action on this basic need is our antiquated tax law which prevents industry from writing off obsolete machines when further use of them is a damaging liability."



Contouring Lathe Cuts Costs On Rolls for Rolling Mills

ALFRED KULLMAN

Vice president and works manager, American Tool Works Co., Cincinnati: "The steel industry recently has become the beneficiary of one of the most radical improvements in machining technique that has occurred in the metalworking industry in many years. Dating from the advent of the first rolling mill designed for rolling shapes from steel, the required shapes were formed on the rolls by means of costly formed tools in a slow-moving lathe. Due to the length of time required to machine a roll, plus the expense of the formed tools, machining of shape rolls was a tedious and costly operation.

"The technique recently perfected for machining such rolls eliminates use of formed tools and materially speeds up the operation, with a resultant reduction in cost to the steel industry. The basic art of reproducing intricate shapes on work from a template by means of a controlled cutting tool in a lathe is not new; its application to roll turning lathes for producing shape rolls is quite new. Introduction of this new technique to the roll industry is creating avid interest amongst roll plant executives and rolling mill builders alike.

"As potential savings through this new method are astronomic, it appears to be a safe prediction that the industry will turn to this new process as a tangible compensation for the steadily increasing steel costs."

Many Modern Machine Tools Out-Perform Oldtimers 3 to 1

CHARLES J. STILWELL

President, Warner & Swasey Co., Cleveland: "In any period of inflation, it is only natural to focus on the fact of higher prices without necessarily taking time to consider what we are getting for the higher prices we pay. Unquestionably it takes more dollars today to buy an automobile than it did to purchase the same make a number of years ago. It is popular to complain about the high prices of cars. Yet today's car offers much more service and riding comfort than did its predecessor. The same case of 'more for your money' holds true with production machinery.

"In the machine tool field, we have a pretty good idea of exactly how much more profitable a modern lathe, milling machine or grinder actually is. In relation to a turret lathe built in 1915, having a productive index of 100 and costing $2893 in present-day currency values, a 1949 machine costing $9690 has a productive ability of 300. The 1949 machine does cost about three times the price of a 1915 machine, but can produce three times as much; hence it would take *three* of the the earlier machines with *three* operators for production equivalent to what *one* operator can turn out on a single modern turret lathe. In spite of its higher first cost, a 1949 machine is more profitable than the older machine by wages of two operators and overhead on two machines.

"From the builder's point of view, the modern machine is even a better bargain to the buyer. The actual materials used cost thirteen times as much as those in the 1915 model; building time is 3.65 times as long, and wage rates are 3.4 higher.

"Hence it is apparent that price tags, though they receive first attention, should not be the prime consideration in the purchase of machine tools or any other plant equipment. The logical 'acid test' is simply the answer to the question: 'What will this new unit do for me in comparison with my present equipment?'"

Carbide Punches and Dies Win Rapid Acceptance

W. G. ROBBINS

President, Carboloy Co. Inc., Detroit: "Recent developments in the field of cemented carbides have been so numerous that it is impossible to cover them all in this brief review. Hence only a few major developments will be discussed. Greatest single technical advance is our new knowledge of how to use these supposedly 'brittle' metals in all kinds of applications where ability to resist shock is a prerequisite.

"Actually we know more about, and have gone ahead

It's LOFTUS
All along the Line

Loftus Engineers, Designs and Constructs Complete Plants and Individual Furnaces

Loftus is fully equipped to handle any furnace problem that you may have—however difficult or exacting.

All Loftus furnaces are tailor-made to meet individual requirements. Their sound design and rugged construction insure higher efficiency at lower operating costs.

Inquiries are invited for all types of Industrial Furnaces—Melting and Heating Furnaces and related equipment for the Steel, Foundry, Aluminum and Brass Industries.

10 SMITHFIELD ST. **LOFTUS ENGINEERING Corporation** PITTSBURGH, PA.

esigners and Builders — Engineers, Consultants, Contractors

further in the past year in adapting carbides to shock applications than in using these metals to resist wear —incongruous as that may sound considering how well and how long their remarkable wear-resisting qualities have been known.

"In the metalworking field one outstanding 1949 development holds promise of important cost-reductions in finished sheet-metal products. I refer to the rapidly growing acceptance of carbides for sheet metal dies and punches—where both shock and wear resistance are important factors. At present, it appears that use of carbides for dies and punches will reach the 'taken for granted' stage in a fraction of the time it took for carbides to reach corresponding position in the cutting tool field.

"Advent of carbides promises to revolutionize the entire art of metal drawing, blanking, forming and piercing. In the near future we will see new types of stamping and drawing presses 'designed for carbides', following the pattern already set in the machine tool field.

"Where do carbide tools go from here? Answering that question no longer is an individual responsibility of the carbide manufacturer, the tool producer, the machine tool builder or the tool user. The fact that each of them is contributing a vital portion of the answer already has been responsible for everyday tool performances far beyond performance considered exceptional only a few short years ago. There is scarcely any variety of which only a few years back was available only in steel, which isn't available in carbide form today. The stunt jobs of yesterday, using some of these tools, have now become routine in production today."

New Machine Tools Can Give Anything Carbides Can Take

HERBERT H. PEASE

President, New Britain Machine Co., New Britain, Conn.: "Today's technical progress is not so much concerned with the invention of new tools as with the working out of efficient methods of using them. As we all saw at the Machine Tool show in 1947, machine tool builders have practically come abreast of the demands made by the marketing of cemented carbide tools. Modern machine tools can handle any feeds and speeds which carbide tools will take.

"One thing left to be developed in carbides is a practical, marketable carbide drill. When that advancement takes place, we will be able to have all-carbide setups on screw machines, for then we will be able to drill holes at the same rate that we can now form and turn.

"We actually have made some interesting tests with a type of carbide-tipped drill which seems to be the answer as far as workability is concerned. This drill has a high speed steel shank with carbide inserts and deep holes for coolant drilled through the shank to the tip.

Coolant forced through these holes under high pressure flushes the chips back through the flutes—which are polished. I believe one of the automotive industries is now using such a drill on production work.

"Besides the invention of marketable carbide drills, one more thing is to be desired in our particular field—that is, quick change-over. As the situation stands now, it takes a set-up man a day or perhaps more to change over a full set of tools on one job to a full set on another job. We, as all other machine tool manufacturers, are constantly working to develop some method whereby tools can be pre-set to a gage on the bench and then put into the machine with the assurance that they will cut to size on the first piece and will not need any further adjustments.

"This is an extremely difficult undertaking because of the two factors of rigidity and adjustability. When a tool holder is made which has all the adjustability necessary both for diameter, length and taper, it generally consists of a number of pieces put together in such a manner that it loses some of its rigidity. On the other hand, when a tool holder is made of one piece and bolted down, it is extremely rigid but lacks the means for making it adjustable. When we lick this problem, we will have a major advancement in our section of the machine tool field.

"As I mentioned in the first paragraph, machine tools have caught up with cutting tools. Now it is a question of finding better methods of utilizing these tools. Better ways must be found for bringing materials to the machine and taking finished pieces away; for cutting down on floor-to-floor time; for keeping tools sharp and accessible; for removing chips; and for more thoroughly instructing operators. These are the main things which we must work out now in order to attain full possibilities of the machine tools which we have today."

Capital Equipment Sales To Be High This Year

HARRY E. CONRAD

Executive secretary, American Society of Tool Engineers, Detroit: "It is not unlikely that 1950 can be one of the best 'machine tool' years since the end of the war. A recent survey revealed that practically half of all manufacturing companies reporting will buy more new capital equipment this year than they did in 1948. Another 35 per cent reported they would buy about the same amount as in 1948.

"With all the talk of a business recession, the results of this study were indeed surprising—although perhaps they should not have been. After all, industry is in the position where it just has to cut costs, and new equipment that will cut costs is about the only avenue open at this time.

"In this connection it was interesting to note that our study showed—for the companies saying they planned to buy more equipment than in 1948—that 52 per cent of their budgets was for new machines to cut costs, 26 per cent was for equipment to modernize existing machines and only 12 per cent for replacement of equipment that had outlived its usefulness through years of service.

"It is possible that the averages for all of industry may not reach the above percentage figures, since we recognize the ASTE membership, through which we made this study, does represent the cream of the more progressive companies, both large and small. Nevertheless the outlook is extremely encouraging. The big job manufacturers of equipment will have is to find the manpower and the time to tell their story to the thousands of companies all over the United States and Canada, who make up this buying power."

New Products and Equipment

Deep Throat Inside Slotter

Designed for fast and accurate inside slotting and punching at any point up to 8 inches inside is a portable hand-operated deep throat inside slotter produced by Beverly Shear Mfg. Co., 3004 W. 111th St., Chicago. Capacity of the new tool is 16 gage mild steel. Punch and die arrangement of five high carbon high chrome cutting blades permits work of accuracy. Four lower blades arranged in rectangular shape to form a die, provide maximum support for the shearing action of the upper blade as it is brought down through the metal into the cavity formed by the lower blades.

All blades are adjustable to compensate for wear and various thicknesses of metal being cut. A slot measuring ⅛ x 2½ inches can be cut at one stroke. If desired, a continuous cut, during which the work may be pivoted at any point of the stroke, can be made on the unit.

Solves Analytical Problems

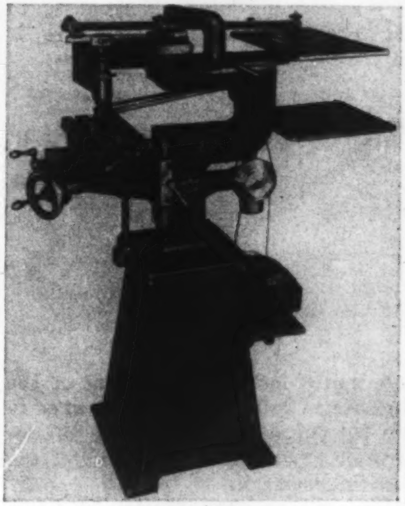
Difficult analytical problems may be solved by the model 83 Monochromator, for covering the ultraviolet, visible and infrared regions of the spectrum when suitable prisms or gratings are used. Made by Perkin-Elmer Corp., Glenbrook, Conn., it consists of the company's model 12 infrared spectrometer optics from entrance slit to exit slit, with the wavelength and slit controls under a standard cover. Optics are totally reflecting so that the instrument can be focused with visible light for use in ultraviolet or infrared as well.

With this instrument as a basic component, instruments can be constructed for problems which arise requiring a higher degree of spectral quality than possessed by standard equipment. Available for use with the instrument are such accessories as cell mounts, special covers and a mirror assembly which permits the beam from the exit to be deflected at right angle or allowed to pass out the special cover.

For Two-Dimensional Engraving

Capable of engraving and profiling in steel dies and molds is the Panto-Engraver, developed by H. P. Preis Engraving Machine Co., 663-G Highway 29, Hillside 5, N. J. An open throat permits engraving to the center of a 30-inch diameter dial or 30-inch wide panel. Pantograph ratios range from 1 to 1 or full size to infinity. The pantograph, cutter spindle and spindle links are mounted in angular contact ball bearings.

Six cutter spindle speeds range from 5000 to 14,000 rpm, power being furnished by a ¼-hp motor. The standard work table is 6 x 12 inches with three T-slots, but an auxiliary table 18 x 24 inches with four T-slots is available. Maximum height of work is 6 inches, cross feed 6 inches and longitudinal feed 6½ inches. All dials are graduated in 0.001-inch.



Dust Collector Is Filterless

Requiring a floor space of 28 x 49 inches and developing 3630 cubic feet per minute, the model 30N50 Dustkop dust collector, made by Aget-Detroit Co., Ann Arbor, Mich., may be installed adjacent to any source of dust. A self-clearing paddle wheel fan, direct driven by 5 hp continuous motor, is capable of clearing lint and strings from buffing, chips, shavings and saw dust, as well as most other types of dusts.

Dust sources which may be handled are four grinding, buffing or polishing wheels of 19 to 24 inches in diameter, large woodworking equipment, multiple abrasive or sanding belts, dust from conveying, packaging or chemicals, etc. Dust is taken from the air in a cyclone separator and deposited in a dust storage compartment of 12 cubic feet capacity. Cleaned air, with any toxic fumes, smoke, etc., is exhausted to the outdoors.

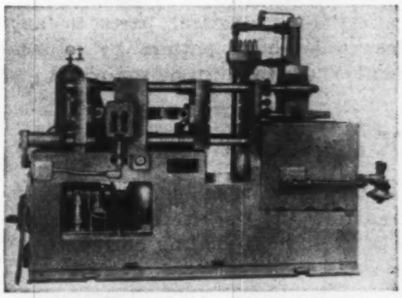
Die Filer Always Vertical

A universal joint file clamp and file setting square assure vertical file position on the model 1500-SR die filing machine made by All American Tool & Mfg. Co., 1014 Fullerton Ave., Chicago 14, Ill. A flexible metallic hose chip blower can be directed at work being filed. An illuminated magnifying glass for attachment to overarm post is also available.

Infinite speed changes within the range of 170 to 470 strokes per minute are obtained by a manual speed control device. This range affords speeds low enough for filing of high chrome-high carbon steels, and high enough for honing operations. Sawing and honing attachments are available. The scotch yoke mechanism, which actuates the file, runs in a sealed oil bath.

High Speed Die Caster

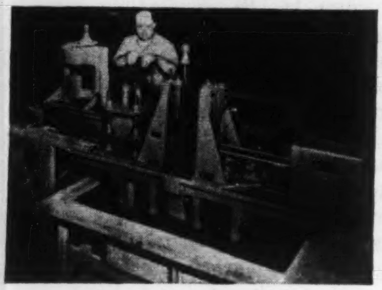
For volume production of dense fine finish plating quality zinc, tin and lead alloy die castings, is the model 500-P die casting machine made by B & T Engineering & Sales Co., 2268 Penobscot Bldg., Detroit 26, Mich. It is offered with shot capacity in cubic inches of 10.5, 12.9, 18.7, 23.8, and 29, with pressure on metal 2800, 2000, 1500, 1250 and 1000 psi, respectively. All hydraulic valves, with the exception of the shot valve, are of the Vickers' gasket mounted type. High pressure steel tubing or piping is equipped with Chiksan high pressure steel swivel joints.



Machine is equipped with gaskets and packing suitable for use with either standard hydraulic oil or nonflammable hydraulic fluids. Machine is operated by extra heavy toggles exerting a locking pressure of 70 tons. Base is of heavy welded steel construction and all working parts, with the exception of the gooseneck, is of heat-treated alloy steel. The machine is electrically interlocked.

Selective Hardening Equipment

Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa., is making available equipment for the continuous radio-frequency selective induction hardening of cylindrical parts at feed rates up to 6 inches per second. It consists of three major components, an automatic loading device, a horizontal rotating scanner and an industrial radio frequency generator.



The loader, consisting of a magazine and hopper, feeds the pieces to be hardened to the scanner through a feeder unit. It is hardened by passing the work through an inductor coil and spray quench ring. Uniformity of case depth is obtained by controlled feeds. Concentricity of case is assured by positive guide and rotation of the cylindrical work piece about its longitudinal axis. Equipment can be used to harden a wide variety of cylindrical parts in any desired hardness pattern by adjustment of electronic timing circuits.

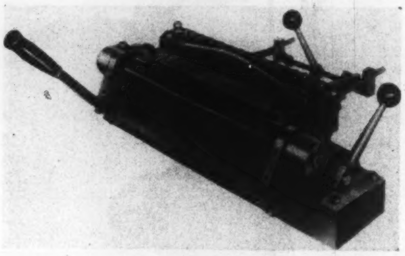
DC Arc Welder Remote Control

All of the machine controls are transferred to the electrode holder by a device for alternating current driven direct current arc welding machines, made by Foster Transformer Co., Cincinnati, O. The remote control unit consists of a control box in a stainless steel housing mounted on the welding machine and a standard holder equipped with a special grip. It is possible to start and stop the welding machine and select polarity, as well as regulating heat.

Connection is made between the holder controls and the control box by means of three wires rope-spiraled in the cable, along with the work cable. The easily-installed device uses a standard holder which is replaceable. Two control knobs at the back of the holder grip concentric with the cable. One actuates a double-throw switch for polarity and the other knob is calibrated for stepless control of heat.

Brake Accessory Makes Box

Brakes of the type made by O'Neil-Irwin Mfg. Co., 304 Eighth Ave., Lake City, Minnesota, may be converted to a precision box and pan brake by using the Di-Acro box finger bar in place of the solid top bar supplied with all standard units. Fingers may be used for both experimental and production operations as they may be adjusted for any box size within their capacity in graduations of ⅛-inch.



Box forming range is from ½ to 24 inches. Depths available are 2, 2½ and 3 inches. Attachment of the box finger still permits the brakes to be set up for a wide range of operation by simple changes to the bending surfaces.

• • •

SHATTERPROOF BLADE: Star Molyflex, a new shatterproof hacksaw blade that is unbreakable when used in a frame, has been developed by Clemson Bros. Inc., Middletown, N. Y. The blades are available in all hand sizes and pitches.

INCREASES INSTALLATION LIFE: North American Refractories Co., Cleveland 14, O., announces the development of Narcoline, a new, slag-resistant plastic refractory that increases the life of installations having slag erosion problems, such as ladle linings.

WITH BUILT-IN BRAKE: Designed for rotating or linear-motion jobs where extreme precision of movement is needed and where motor must be stopped from top speed in the minimum number of turns, a new high-speed motor is made by Electro-Aire Inc., North Hollywood, Calif. The 1/100-hp dc motor has a built-in electrical mechanical brake that is preset at the factory. Running torque is 1.1 inch-ounce at 19,000 rpm, 28 v, dc; brake operates within range of 18 to 30 v.

CONTAINS NO KEROSENE: Ensign 318 Pen-a-trate, a fast-acting, lubricant base penetrating oil with super capillary action for positive penetration of rusted or "frozen" metal parts is introduced by Ensign Products Co., Cleveland 5, O. It is not a solvent and contains no kerosene. It may be sprayed or dripped over parts to be loosened; or parts may be dipped or soaked.

CAPACITY OF 6 GPM: A junior variable control pump, made by Superdraulic Corp., Detroit 4, Mich., has capacity of 6 gallons per minute at 5000 pounds pressure and is suited as a pulsation-free feed for production machines. It is available without the base for flange mounting.

MAGNET SLING CHAIN: Woodhouse Chain Works, Trenton, N. J., announces a new magnet sling chain that is designed so its top plate keeps the three attachment chains in the proper place when fastened to the magnet. The shackle is made with a bronze bearing and equipped with a lubrication fitting. Safe working load capacity is 50,000 pounds.

ELIMMINATE SEPARATE OPERATION: Combination bolt heading and marking hammers of solid carbide for automatic bolt heading machines are available from Carboloy Co. Inc., Detroit 32, Mich. They make it possible to eliminate separate marking operation. Hammers with markings are made with either male or female markings and in a complete range of sizes.

PLATE TYPE RHEOSTAT: A new plate-type rheostat, introduced by General Electric's Control Divisions, Schenectady 5, N. Y., is furnished in three forms: The 6-inch form (27 resistance divisions), 9-inch form (52 resistance divisions) and 12-inch form (70 resistance divisions). Unit is designed for field control of direct current shunt or compound-wound motors, self-excited generators, separately-excited generators and synchronous motors.

Calendar of Meetings for 1950

JANUARY

Jan. 9-13, Society of Automotive Engineers: Annual meeting and engineering display, Hotel Book-Cadillac, Detroit. Society headquarters are at 29 W. 39th St., New York.

Jan. 10-11, American Home Laundry Manufacturers' Association: Fourth national home laundry conference, in Chicago.

Jan. 10-12, Conference on Industrial and Safety Problems of Nuclear Technology: Sponsored by New York University and Atomic Energy Commission, at New York University, Washington Sq., New York.

Jan. 10-12, Society of the Plastics Industry: Reinforced plastics division meeting and fifth annual technical session, Hotel Cleveland, Cleveland. Society headquarters are at 295 Madison Ave., New York.

Jan. 12-13, Southern Supply & Machinery Distributors' Association: Industrial distribution forum and midyear meeting, Edgewater Gulf Hotel, Biloxi, Miss.

Jan. 15-19, Associated Equipment Distributors: Annual meeting, Stevens Hotel, Chicago. Group's headquarters are at 360 N. Michigan Ave., Chicago.

Jan. 16-18, Truck-Trailer Manufacturers Association: Meeting, Edgewater Gulf Hotel, Edgewater Park, Miss. Association headquarters are at 809 National Press Bldg., Washington.

Jan. 16-19, Plant Maintenance Show: Sponsored by American Society of Mechanical Engineers and Society for the Advancement of Management, at the Public Auditorium, Cleveland. ASME headquarters are at 29 W. 39th St., New York.

Jan. 18, American Society of Body Engineers: Annual dinner meeting, Detroit Leland Hotel, Detroit. Society headquarters are at 100 Farnsworth, Detroit.

Jan. 18-20, American Management Association: Conference on management problems, in San Francisco. Association headquarters are located at 330 W. 42nd St., New York.

Jan. 18-20, American Society of Civil Engineers: Annual meeting, Hotel Commodore, New York. Society headquarters are at 33 W. 39th St., New York.

Jan. 19, American Iron & Steel Institute: Regional technical meeting, Hotel Statler, Buffalo. Institute headquarters are at 350 Fifth Ave., New York.

Jan. 20, Malleable Founders' Society: Semiannual meeting, Hotel Cleveland, Cleveland. Society headquarters are in the Union Commerce Bldg., Cleveland.

Jan. 22-24, Institute of Scrap Iron & Steel Inc.: Annual convention, Hotel Statler, Washington. Institute headquarters are in Dupont Circle Bldg., Washington.

Jan. 23-24, Industrial Furnace Manufacturers Association: Meeting, Dearborn Inn, Dearborn, Mich. Association headquarters are at 420 Lexington Ave., New York.

Jan. 23-26, Institute of Aeronautical Sciences: Annual meeting, Hotel Astor, New York. Society headquarters are at 2 E. 64th St., New York.

Jan. 23-27, American Society of Heating & Ventilating Engineers: Southwest air conditioning exposition, State Fair Park, Dallas. Society headquarters are at 480 Lexington Ave., New York.

Jan. 30-Feb. 1, American Material Handling Society, Chicago Chapter: Midwest material handling conference, in conjunction with Illinois Institute of Technology, in Chicago.

FEBRUARY

Feb. 2-3, Electric Maintenance Engineers of Milwaukee: 11th annual industrial electrical equipment exposition, at the Public Service Bldg., Milwaukee.

Feb. 7-9, Ohio Hardware Association: Exposition, Public Auditorium, Cleveland. Association headquarters are at 175 S. High St., Columbus, O.

Feb. 9-10, American Foundrymen's Society, Birmingham Chapter: Regional conference, Birmingham. Society headquarters are at 222 W. Adams St., Chicago.

Feb. 9-10, American Foundrymen's Society, Wisconsin Chapter: Regional conference, Schroeder Hotel, Milwaukee. Society headquarters are at 222 W. Adams St., Chicago.

Feb. 9-11, Society of Plastics Engineers: Meeting, Hotel Cleveland, Cleveland.

Feb. 12-16, American Institute of Mining & Metallurgical Engineers: General meeting, Hotel Statler, New York. Institute headquarters are at 29 W. 39th St., New York.

Feb. 13-14, Society of the Plastics Industry (Canada): Canadian annual meeting, Royal York Hotel, Toronto, Ont. The Canadian branch is a part of the American group whose headquarters are at 295 Madison Ave., New York.

Feb. 14-16, Purchasing Agents Association of Chicago: Products show, Hotel Sherman, Chicago. Association headquarters are at 134 N. La Salle St., Chicago.

Feb. 20-21, American Material Handling Society, Indianapolis Chapter: Materials handling conference sponsored jointly with Purdue University, at Lafayette, Ind.

Feb. 24, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

Feb. 27-Mar. 3, American Society for Testing Materials: Committee week and spring meeting, Hotel William Penn, Pittsburgh. Society headquarters are at 1916 Race St., Philadelphia.

Feb. 28-Mar. 1, Chamber of Commerce of the United States: National marketing conference, Hotel Book-Cadillac, Detroit. Chamber headquarters are at 1615 H St., Washington.

MARCH

Mar. 2-4, Society of the Plastics Industry, Pacific Coast Section: Annual conference, Hotel Del Coronado, San Diego, Calif. Society headquarters are at 295 Madison Ave., New York.

Mar. 3, Malleable Founders' Society: Eastern sectional meeting, Hotel Commodore, New York. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 10-11, American Foundrymen's Society, Ohio Chapters: Regional conference, Cincinnati. Society headquarters are at 222 W. Adams St., Chicago.

Mar. 14-16, Society of Automotive Engineers: Passenger car, body and production meeting, Hotel Book-Cadillac, Detroit. Society headquarters are at 29 W. 39th St., New York.

Mar. 20-25, Concrete Reinforcing Steel Institute: Meeting, at The Shamrock, Houston. Institute headquarters are at 38 S. Dearborn St., Chicago.

Mar. 21-22, Steel Founders' Society of America: Annual meeting, Edgewater Beach Hotel, Chicago. Society headquarters are in the Midland Bldg., Cleveland.

Mar. 24, Malleable Founders' Society: Western **sectional meeting,** Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 28-31, Society of the Plastics Industry: Fourth national plastics exposition, Navy Pier, Chicago. Society headquarters are at 295 Madison Ave., New York.

APRIL

Apr. 3-4, Association of Iron & Steel Engineers: Spring conference, Birmingham. Association headquarters are in the Empire Bldg., Pittsburgh.

Apr. 4-7, National Association of Corrosion Engineers: Sixth annual conference, St. Louis. Association headquarters are in the Milam Bldg., Houston.

Apr. 4-8, Chicago Technical Societies Council: National production exposition, Stevens Hotel, Chicago. Exhibit manager is John C. Toohy, 176 W. Adams St., Chicago.

Apr. 5-6, Midwest Power Conference: Sponsored by Illinois Institute of Technology and 18 universities and professional societies, at Sherman Hotel, Chicago. Conference director is Roland A. Budenholzer, Illinois Institute of Technology, 3300 S. Federal St., Chicago.

Apr. 10-12, Iron & Steel Division, AIME: 33rd annual conference, Netherland Plaza Hotel, Cincinnati. AIME headquarters are at 29 W. 39th St., New York.

Apr. 10-14, American Society of Tool Engineers: Industrial exposition, Philadelphia Convention Hall, Philadelphia. Society headquarters are in the Penobscot Bldg., Detroit.

Apr. 11-12, American Zinc Institute: Meeting, Hotel Statler, St. Louis. Institute headquarters, 60 E. 42nd St., New York.

Apr. 12-14, National Petroleum Association: Meeting, Hotel Cleveland, Cleveland. Association headquarters are in the Munsey Bldg., Washington.

Apr. 12-14, American Society of Mechanical Engineers: Spring meeting, Hotel Statler, Washington. Society headquarters are at 29 W. 39th St., New York.

April. 17-19, Society of Automotive Engineers: Aeronautic meeting and aircraft engineering display, Hotel Statler, New York. Society headquarters are at 29 W. 39th St., New York.

Apr. 19-21, American Society of Civil Engineers: Spring meeting, Los Angeles. Society headquarters are at 33 W. 39th St., New York.

Apr. 23-27, American Ceramic Society: Annual meeting, Hotel Statler, New York. Society headquarters are at 2525 N. High St., Columbus, O.

Apr. 24, Packaging Machinery Manufacturers Institute: Semiannual meeting, Hotel Sheraton, Chicago. Institute headquarters are at 342 Madison Ave., New York.

Apr. 24-27, American Management Association: National packaging exposition, Navy Pier, Chicago. Association headquarters are at 330 W. 42nd St., New York.

Apr. 24-27, National Highway Users Conference: Annual meeting, in Washington.

Apr. 25-26, Metal Powder Association: Annual metal powder show, Book-Cadillac Hotel, Detroit. Association headquarters are at 420 Lexington Ave., New York.

Apr. 25-26, Machine Tool Electrification Forum: Sponsored by Westinghouse Electric Corp., at Hotel Statler, Buffalo.

Apr. 26-28, American Petroleum Institute: Eastern district, division of production meeting, at Hotel Cleveland, Cleveland. Institute headquarters are at 50 W. 50th St., New York.

Apr. 27-28, American Steel Warehouse Association: Annual meeting, The Shamrock, Houston. Association headquarters are in the Terminal Tower, Cleveland.

Apr. 28, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

MAY

May 7-9, Conveyor Equipment Manufacturers Association: Meeting, The Homestead, Hot Springs, Va. Association headquarters are at 1129 Vermont Ave. N. W., Washington.

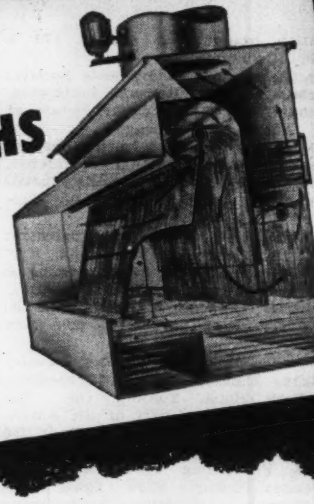
May 8-11, Liquefied Petroleum Gas Association: Convention and trade show, the Palmer House, Chicago. Association headquarters are at 11 S. LaSalle St., Chicago.

May 8-12, National Association of Textile Machinery Manufacturers: Exhibition, Atlantic City Auditorium, Atlantic City,

BINKS

Dynaprecipitor
Water Wash
SPRAY BOOTHS

LOCAL & STATE HEALTH AUTHORITIES
APPROVED
INSURANCE UNDERWRITERS



NO OTHER SPRAY BOOTHS GIVE YOU ALL THESE ADVANTAGES

1 **APPROVED PERFORMANCE AND CONSTRUCTION**
When you install a Binks Dynaprecipitor Spray Booth in your finishing department you have done everything possible to eliminate fire and health hazards. These booths meet the requirements of local and state authorities...are endorsed by insurance companies. They are the mark of a safely equipped shop.

2 **EXHAUST AIR WASHED 5 TIMES**
The patented Dynaprecipitor principle draws fumes and over-spray through 5 unbroken water-curtains before it is vented... clean and dry.

3 **NO NOZZLES TO CLOG**
The unique water distribution system in these booths eliminates nozzles... guarantees thorough washing.

4 **FASTER PRODUCTION**
Stops *drift*...lets you place spray stations closer to each other. Minimizes clean-up time.

5 **BETTER SHOP MORALE**
There is no paint smell...air in the shop remains fresh...and the shop stays cleaner.

6 **RECLAMATION OF OVER-SPRAY**
All paint is washed out of the over-spray and trapped in the collecting pan where it can be easily reclaimed.

7 **SIMPLIFIED CONSTRUCTION**
Dynaprecipitor booths are shop fabricated in standard sizes from 4 to 20 feet wide. Panels bolt together with gasketed joints, quickly and simply.

8 **PRICED RIGHT**
This is equipment on which you do not pay a premium to get the best. Dynaprecipitor spray booths are unsurpassed...but you don't pay any more for them.

9 **ECONOMICAL TO OPERATE**
The same water is recirculated. Only cost is operation of the circulation pump.

"We hope buyers will compare our Dynaprecipitor with other water wash booths. It's always very convincing!"

J. F. Roche
Chairman of the Board

Send for Bulletin 500
and see for yourself the many great advantages of these modern, well engineered spray booths. No obligation.

Binks MANUFACTURING COMPANY
3134-40 Carroll Ave., Chicago 12, Ill.

NEW YORK DETROIT LOS ANGELES ATLANTA BOSTON CLEVELAND
DALLAS MILWAUKEE NASHVILLE PHILADELPHIA PITTSBURGH
ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

CALENDAR OF MEETINGS

N. J. Association president is E. Kent Swift, Whitinsville, Mass.

May 8-12, American Foundrymen's Society: Annual convention and exhibition, Public Auditorium, Cleveland. Society headquarters are at 222 W. Adams St., Chicago.

May 15-17, Industrial Furnace Manufacturers Association: Annual meeting, The The Hometead, Hot Springs, Va. Association headquarters are at 420 Lexington Ave., New York.

May 18-20, Automotive Engine Rebuilders Association: Meeting, Hotel New Jefferson, St. Louis. Association headquarters are at 409 N. Capitol Ave., Indianapolis.

May 19, Malleable Founders' Society: Eastern sectional meeting, Commodore Hotel, New York. Society headquarters are in the Union Commerce Bldg., Cleveland.

May 22-24, American Supply & Machinery Manufacturers' Association: Meeting, Atlantic City, N. J. Association headquarters are in the Clark Bldg., Pittsburgh.

May 23-26, National District Heating Association: Annual meeting, Grove Park Inn, Asheville, N. C. Association headquarters are at 827 N. Eucid Ave., Pittsburgh.

May 24-25 (Tentative), American Iron & Steel Institute: Annual meeting, New York. Institute headquarters are at 350 Fifth Ave., New York.

May 25-27, Society for Experimental Stress Analysis: Meeting, Hotel Statler, Cleveland. Society post office address is Box 168, Cambridge, Mass.

May 26, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

May 29 - June 9, Canadian International Trade Fair: At Toronto, Ont.

JUNE

June 1-2, American Society for Quality Control: National convention and midwest conference, Milwaukee Auditorium, Milwaukee. Society headquarters are at 4949 W. 65th St., Chicago.

June 1-3, Electric Metal Makers Guild: Meeting, Shawnee Hotel, Springfield, O.

June 4-9, Society of Automotive Engineers: Summer meeting, at French Lick Springs Hotel, -French Lick, Ind. Society headquarters are at 29 W. 39th St., New York.

June 5-7, American Gear Manufacturers Association: Annual meeting, The Homestead, Hot Springs, Va. Association headquarters are in the Empire Bldg., Pittsburgh.

June 11-14, National Association of Purchasing Agents: Annual meeting and show, Cleveland Auditorium, Cleveland. Association is at 11 Park Place New York.

June 12-16, American Electroplaters' Society: International electrodeposition conference, Hotel Statler, Boston. Society headquarters are at 473 York Rd., Jenkintown, Pa.

June 15-17, Material Handling Institute: Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute headquarters are in the Clark Bldg., Pittsburgh.

June 19-23: American Society of Mechanical Engineers: Semiannual meeting, Hotel Statler, St. Louis. Society headquarters are at 29 W. 39th St., New York.

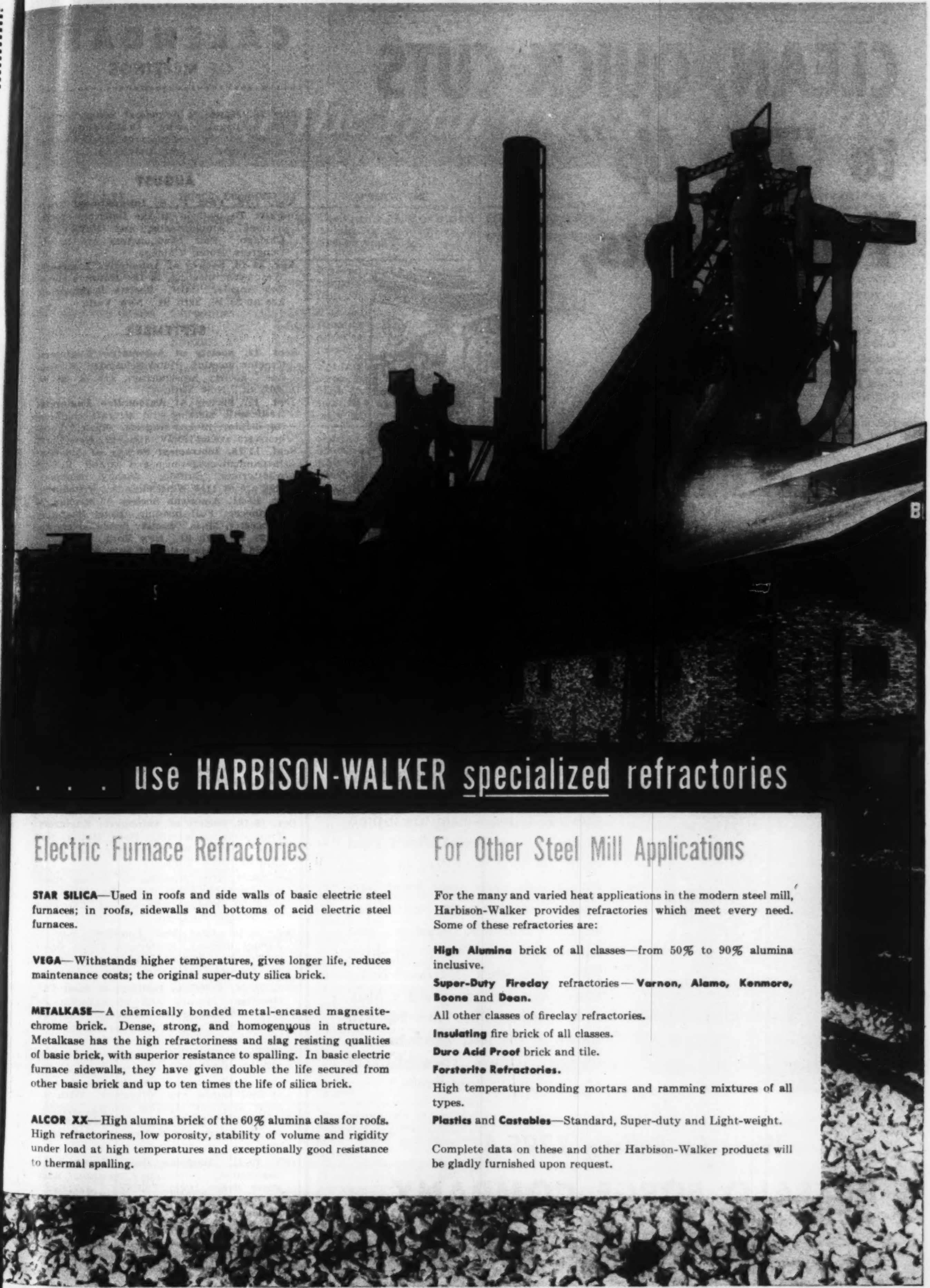
June 22-23, Malleable Founders' Society: Annual meeting, The Homestead, Hot Springs, Va. Society headquarters are in the Union Commerce Bldg., Cleveland.

June 26-30, American Society for Testing Materials: Annual meeting and exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J. Society headquarters are at 1916 Race St., Philadelphia.

JULY

July 12-14, American Society of Civil Engineers: Summer convention, Toronto, Ont. Society headquarters are at 33 W. 39th St., New York.

July 12-14, American Home Laundry Manufacturers' Association: Meeting, Atlantic City, N. J.



Electric Furnace Refractories

STAR SILICA—Used in roofs and side walls of basic electric steel furnaces; in roofs, sidewalls and bottoms of acid electric steel furnaces.

VEGA—Withstands higher temperatures, gives longer life, reduces maintenance costs; the original super-duty silica brick.

METALKASE—A chemically bonded metal-encased magnesite-chrome brick. Dense, strong, and homogenuous in structure. Metalkase has the high refractoriness and slag resisting qualities of basic brick, with superior resistance to spalling. In basic electric furnace sidewalls, they have given double the life secured from other basic brick and up to ten times the life of silica brick.

ALCOR XX—High alumina brick of the 60% alumina class for roofs. High refractoriness, low porosity, stability of volume and rigidity under load at high temperatures and exceptionally good resistance to thermal spalling.

For Other Steel Mill Applications

For the many and varied heat applications in the modern steel mill, Harbison-Walker provides refractories which meet every need. Some of these refractories are:

High Alumina brick of all classes—from 50% to 90% alumina inclusive.

Super-Duty Fireclay refractories—**Varnon, Alamo, Kenmore, Boone** and **Dean.**

All other classes of fireclay refractories.

Insulating fire brick of all classes.

Duro Acid Proof brick and tile.

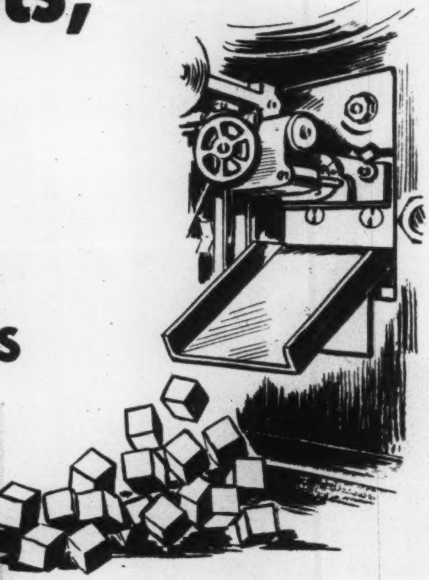
Forsterite Refractories.

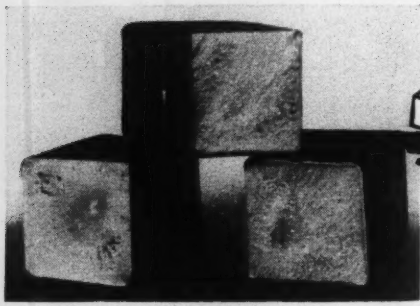
High temperature bonding mortars and ramming mixtures of all types.

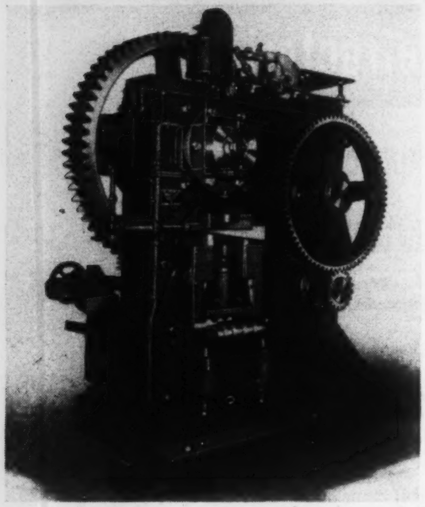
Plastics and **Castables**—Standard, Super-duty and Light-weight.

Complete data on these and other Harbison-Walker products will be gladly furnished upon request.

CLEAN, QUICK CUTS
to "Pile Up"
Your Profits,
Too!
with
"Buffalo"
BILLET SHEARS







If you could see the No. 17 Shear "bite off" SIX 9" squares (.20 C. steel) in a minute, you'd see how this speed "piles up" profits! And "Buffalo" Billet Shears are built to CONTINUE delivering this fast, powerful shearing action—many are still on active 24-hour service after a good many years. A complete range of 11 sizes to meet your most particular requirements on flats, angles, channels, squares and rounds. For instance, for high production work "Buffalo" Billet Shears can be arranged for Multiple cutting, like the No. 10 shown at the left, which has air-operated clutch, counterbalance and automatic hold-down.

Write for Bulletin 3295-A

BUFFALO FORGE COMPANY
158 Mortimer St. Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

CALENDAR
OF MEETINGS

July 28, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

AUGUST

Aug. 7-19, First U. S. International Trade Fair: To be held at the Coliseum, International Amphitheater and Navy Pier, Chicago. Fair headquarters are in the Congress Hotel, Chicago.

Aug. 14-16, Society of Automotive Engineers: West coast meeting, at the Biltmore Hotel, Los Angeles, Calif. Society headquarters are at 29 W. 39th St., New York.

SEPTEMBER

Sept. 11, Society of Automotive Engineers: Tractor meeting, Hotel Schroeder, Milwaukee. Society headquarters are at 29 W. 39th St., New York.

Sept. 11, Society of Automotive Engineers: Aeronautic meeting and aircraft engineering display, in Los Angeles. Society headquarters are at 29 W. 39th St., New York.

Sept. 11-15, Instrument Society of America: Instrument conference and exhibit, Buffalo Auditorium, Buffalo. Society headquarters are at 1117 Wolfendale St., Pittsburgh.

Sept. 19-21, American Society of Mechanical Engineers: Fall meeting, Hotel Sheraton, Worcester, Mass. Society headquarters are at 29 W. 39th St., New York.

Sept. 26-29, Association of Iron & Steel Engineers: Exposition, Public Auditorium, Cleveland. Association headquarters are in the Empire Bldg., Pittsburgh.

OCTOBER

Oct. 11-13, American Society of Civil Engineers: Fall meeting, Chicago. Society headquarters are at 33 W. 39th St., New York.

Oct. 12-13, Foundry Equipment Manufacturers' Association: Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association headquarters are in the Engineers Bldg., Cleveland.

Oct. 15-17, Conveyor Equipment Manufacturers Association: Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association headquarters are at 1129 Vermont Ave. N. W., Washington.

Oct. 16-18, Society of Automotive Engineers: Transportation meeting, Hotel Statler, New York. Society headquarters are at 29 W. 39th St., New York.

Oct. 16-21, Wire Association: Annual meeting, Lord Baltimore Hotel, Baltimore. Association headquarters are at 300 Main St., Stamford, Conn.

Oct. 19-20, Gray Iron Founders' Society: Annual meeting, Netherland Plaza Hotel, Cincinnati. Society headquarters are in the National City Bank Bldg., Cleveland.

Oct. 23-26, American Institute of Steel Construction: Meeting and photographic exhibit, The Shamrock, Houston. Institute headquarters are at 101 Park Ave., New York.

Oct. 23-27, American Society for Metals: Annual metal show, International Amphitheater, Chicago. Society headquarters are at 7301 Euclid Ave., Cleveland. With this show American Welding Society, Institute of Metals Division of AIME and Society for Nondestructive Testing also hold meetings.

Oct. 29-31, American Gear Manufacturers Association: Semiannual meeting, Edgewater Beach Hotel, Chicago. Association headquarters are in the Empire Bldg., Pittsburgh.

Oct. 29-Nov. 1, National Tool & Die Manufacturers Association: Annual convention, Hotel Statler, Cleveland. Association headquarters are in the Union Commerce Bldg., Cleveland.

VANCORAM
BRAND

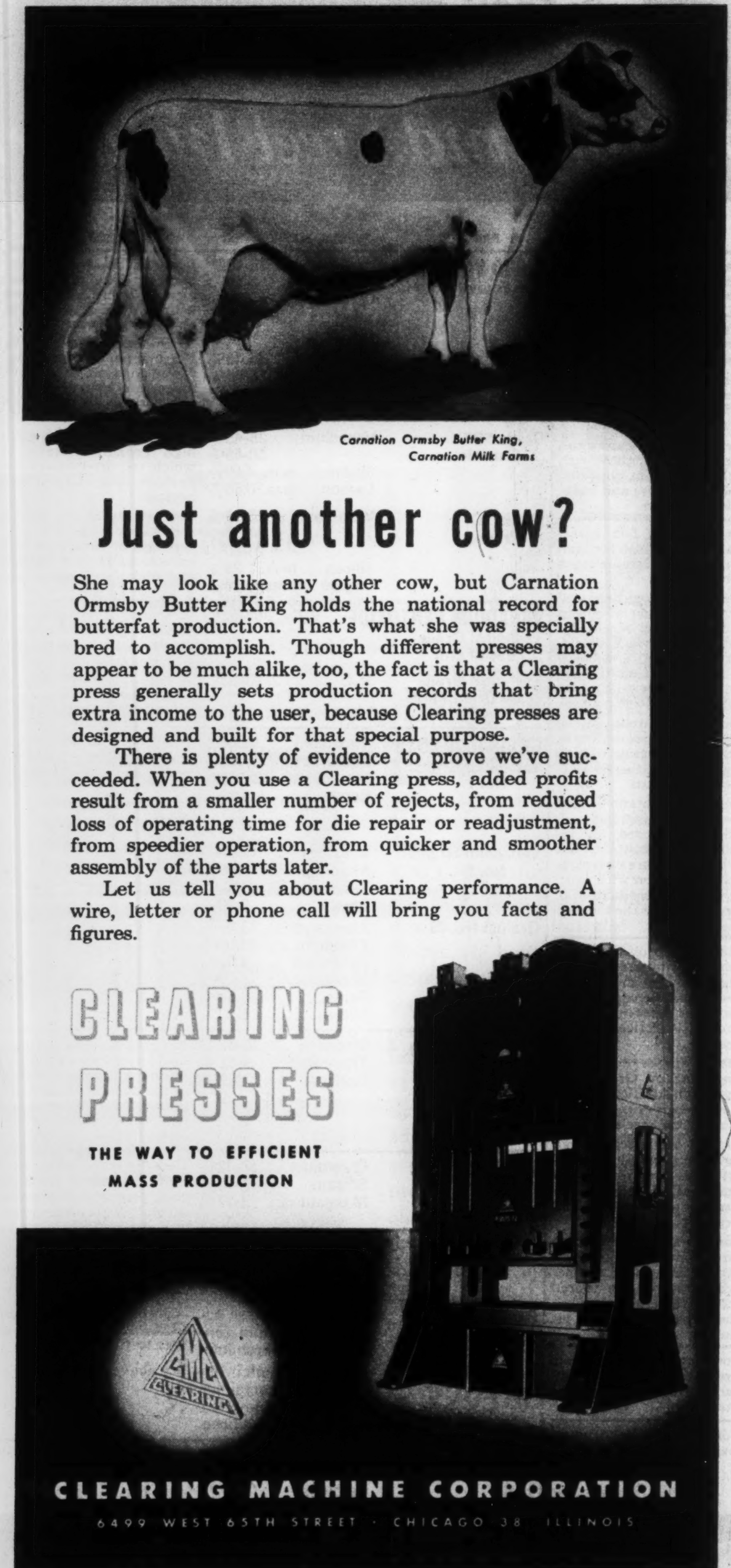
roducts for the Iron and Steel Industries

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALSIFER	Aluminum......20% Silicon.........40% Iron...........40%	Used principally as a steel deoxidizer and for grain size control.
FERRO CHROMIUM High Carbon Grade	Chromium....66-70% Carbon........4-6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium....62-66% Carbon........4-6% Silicon........6-9%	For alloyed cast irons. Readily soluble as a ladle addition at the lower temperatures of cast iron.
Low Carbon Grades	Chromium....67-72% Carbon...06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless and heat-resistant types.
FERRO SILICON 25-30% Grade	Silicon.......25-30%	Deoxidizer for open hearth steels; also for high silicon, corrosion-resistant iron castings.
50% Grade	Silicon.......47-52%	Used as a deoxidizer and for the addition of silicon to high silicon steels, for springs, electrical sheets, etc. Pulverized form used as ladle addition to cast irons for silicon content and graphitization control.
75% Grade	Silicon.......74-79%	For high content silicon steels, such as spring steels, sheets and forgings of high magnetic qualities for electrical apparatus.
High Silicon Grades 80-85% 85-90% 90-95%	Silicon.....80-84.9% Silicon.....85-89.9% Silicon.......90-95%	For high content silicon steels where small ladle additions are used for required silicon content. Also for manufacture of hydrogen by reaction with caustic soda and production of magnesium by the Pidgeon process.
FERRO TITANIUM High Carbon Grade	Titanium.....15-18% Carbon........6-8%	Final ladle addition to control "rimming" action and to clean effervescing steel. Final deoxidizer and scavenger for steel castings and fully killed ingot steels.
Medium Carbon Grade	Titanium.....17-21% Carbon......3-4.50%	Often preferred to the High Carbon Grade as a final ladle addition to very low carbon rimming or effervescing steels.
Low Carbon Grades 20-25% Ti Grade	Titanium.....20-25% Carbon...max. 0.10% Silicon......max. 4% Aluminum max. 3.50%	Carbide stabilizer in high chromium corrosion-resistant steels of extremely low aluminum content. Deoxidizer for some casting and forging steels.
40% Ti Grade	Titanium.....38-43% Carbon...max. 0.10% Silicon......max. 4% Aluminum...max. 8%	Carbide stabilizer in high chromium corrosion-resistant steels, where smaller ladle additions are desired and extremely low aluminum content is not essential.
ALUMINUM	Aluminum ... 85-99%	For deoxidation and grain size control of steel. (Ingot, shot, grain and special shapes.)
VANADIUM METAL 90% Grade 95% Grade 99.7% Grade	Vanadium ...... 91% Vanadium ...... 95% Vanadium 99.7%	For iron-free, low-iron, or low-impurity alloys.

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
FERRO VANADIUM Iron Foundry Grade	Vanadium....38-42% Silicon........7-11% Carbon.....about 1%	For iron foundry use. Imparts remarkable improvement in physical properties with no sacrifice of machinability; highly soluble, insuring complete diffusion.
Grade "A" (Open Hearth)	Vanadium....35-45% 50-55% Silicon...max. 7.50% Carbon...max. 3.00%	For low percentage vanadium content of rolled, forged or cast constructional steels. Also used in vanadium cast irons.
Grade "B" (Crucible)	Vanadium....35-45% 50-55% Silicon...max. 3.50% Carbon...max. 0.50%	For tool steels and special high vanadium steels in which required limits for carbon and silicon are narrow.
Grade "C" (Primos)	Vanadium....35-45% 50-55% 70-80% Silicon...max. 1.25% Carbon...max. 0.20%	For tool steels and special steels requiring high percentages of vanadium and exceptionally low carbon and silicon content.
VANADIUM PENTOXIDE Technical Grade Fused Form	V_2O_5..88-92%	A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
Technical Grade Air Dried Form	V_2O_5....... 83-85%	A base for preparation of numerous chemical compounds (catalysts, etc.).
GRAINAL ALLOYS Vanadium Grainal No. 1	Vanadium....25.00% Aluminum....10.00% Titanium.....15.00% Boron.........0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Vanadium Grainal No. 6	Vanadium....13.00% Aluminum....12.00% Titanium.....20.00% Boron.........0.20%	See above.
Grainal No. 79	Aluminum....13.00% Titanium.....20.00% Zirconium.....4.00% Manganese....8.00% Boron.........0.50% Silicon........5.00%	See above.
GRAPHIDOX No. 4	Silicon ...... 48-52% Titanium..... 9-11% Calcium 5-7%	For graphitization of iron; ladle treatment insures normal graphite, free from dentritic structure; reduces chill; efficient inoculant in production of high strength irons.
V-FOUNDRY ALLOYS V-5 Grade	Chromium....38-42% Silicon.......17-19% Manganese....8-11%	Used in cast irons as a ladle addition. Reduces chill, promotes uniformity of structure, increases strength and hardness.
V-7 Grade	Chromium....28-32% Silicon.......15-21% Manganese...14-16%	See above.
BRIQUETTES Ferro Chromium	Hexagonal. Weigh approx. 3¾ lb. and contain 2 lb. of chromium.	A practical and convenient form for adding ferro-alloys to the cupola.
Ferro Silicon	Two sizes, both cylindrical, one containing 1 lb. of silicon; the other, 2 lb. of silicon.	See above.
MISCELLANEOUS	Special ferro-alloys, metals, chemicals and carbides.	To meet individual requirements.

VANADIUM CORPORATION OF AMERICA

0 LEXINGTON AVENUE, NEW YORK 17, N. Y. · DETROIT · CHICAGO · CLEVELAND · PITTSBURG



Carnation Ormsby Butter King,
Carnation Milk Farms

Just another cow?

She may look like any other cow, but Carnation Ormsby Butter King holds the national record for butterfat production. That's what she was specially bred to accomplish. Though different presses may appear to be much alike, too, the fact is that a Clearing press generally sets production records that bring extra income to the user, because Clearing presses are designed and built for that special purpose.

There is plenty of evidence to prove we've succeeded. When you use a Clearing press, added profits result from a smaller number of rejects, from reduced loss of operating time for die repair or readjustment, from speedier operation, from quicker and smoother assembly of the parts later.

Let us tell you about Clearing performance. A wire, letter or phone call will bring you facts and figures.

CLEARING PRESSES
THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION
6499 WEST 65TH STREET · CHICAGO 38 ILLINOIS

CALENDAR
OF MEETINGS

Oct. 30-Nov. 1, National Lubricating Grease Institute: Meeting, Edgewater Beach Hotel, Chicago. Institute headquarters are at 498 Winspear Ave., Buffalo.

NOVEMBER

Nov. 2-3, Society of Automotive Engineers: Diesel engine meeting, Hotel Knickerbocker, Chicago. Society headquarters are at 29 W. 39th St., New York.

Nov. 9-10, Society of Automotive Engineers: Fuels and lubricants meeting, the Mayo, Tulsa, Okla. Society headquarters are at 29 W. 39th St., New York.

Nov. 26-Dec. 1, American Society of Mechanical Engineers: Annual meeting, Hotel Statler, New York. Society headquarters are at 29 W. 39th St., New York.

DECEMBER

Dec. 7-9, Electric Furnace Steel Committee, AIME: Eighth annual meeting, William Penn Hotel, Pittsburgh. AIME headquarters are at 29 W. 39th St., New York.

To Aid Freight Handling

INCREASED payloads may result from current investigations of the Navy on how to make optimum use of available space in both highway trucks and railway freight cars.

The service's most important project currently at its supply research and development facility, Bayonne, N. J., is the investigation of pallet design and construction, featuring tests that simulate extreme conditions under which pallets are used in shipping, receiving and warehousing.

Work along these lines promises to improve unit-load shipment methods not only for the military, but for manufacturing concerns in their routine business.

Most significant result of the pallet study is the improvement of the Navy's standard pallet. This was formerly a 48 x 48-inch, two-way entry type and was widely utilized during the war. Its successor is the more versatile four-way entry model with a deck area measuring 40 x 48 inches.

The former pallets were suited chiefly to railway use. Two of them could be placed side by side in the average boxcar, still leaving ample room for maneuvering. However, they could not be so placed in a highway truck. The new pallets not only can be used in railway cars but also in highway trucks.

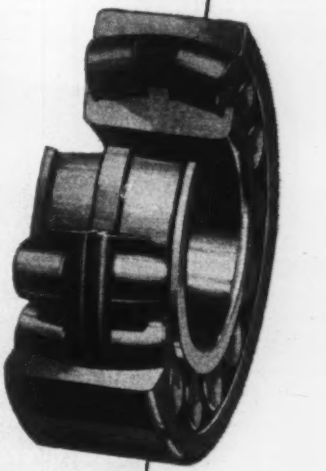
Overall design of the new units allows a practical production process for manufacturing, and permits easy replacement of damaged members. Use of pallet bolts instead of screw nails also allows pallets to be shipped knocked down on return trips.

NEVER TOO MUCH... NEVER TOO LITTLE
BUT **ALWAYS** JUST RIGHT

because of
TOLERANCE CONTROL

Another reason why industry prefers SKF

Remember leapfrog? How you used to have to skim over just right? Well, it's very much the same thing in specifying bearings. You don't want tolerances too great... and you don't want tolerances closer than the job demands. But you want to be sure that tolerances are *right*... are *always* properly controlled... *always* meet established standards. SKF adheres rigidly to these standards. Ceaseless vigilance in every stage of production assures complete control of tolerance throughout the entire manufacturing cycle. You can always be sure that any SKF Bearing will exactly meet your requirements... and will meet them again and again. Never forget, either, that *tolerance control* is only *one* reason why SKF Bearings will help you build equipment which, through smooth, economical performance, helps develop greater acceptance for your product. SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.



SKF
Ball and Roller Bearings

8 REASONS
WHY SKF
IS PREFERRED
BY ALL INDUSTRY

INTEGRITY
CRAFTSMANSHIP
METALLURGY
SURFACE FINISH
PRODUCT UNIFORMITY
ENGINEERING SERVICE
FIELD SERVICE

Inventors and Pioneers of the Self-Aligning Ball Bearing
and Spherical Roller Bearing

7050

CASE No. 260
Refrigerator Manufacturer

ANNUAL SAVINGS OF $28,000 on original expenditure of $18,000, and improved working conditions.

(a) Savings in Effort (estimated) 25%
(b) Savings in Time (estimated) 20%
(c) Savings in Space....... 20%
(d) Savings in less damage to ware

QUOTING CUSTOMER'S* STATEMENT:

"A yearly savings of $28,000 was made with an expenditure of $18,000 for an installation of roller conveyor. Formerly our units were assembled on their crate bases which in turn had four casters mounted on the bases for maneuverability. In the process of assembly the unit had to be removed innumerable times from the assembly line and at various locations, to pass through test sections, touch-ups, inspection points and re-operations. By removing the casters; thus eliminating the cost of casters, nails and installation, and placing roller conveyor on the floor, the units are now pushed about more easily. This method has meant a 20% savings in floor space as well as providing a neater appearance to the complete operation. Experience has since shown a marked improvement in working conditions, increased production, less damaged ware and decreased maintenance repair. The complete installation paid for itself in 6½ months."

*Name on Request

Another true Case History showing dollars-and-cents savings effected when Logan equipment is used to save effort and time, and to increase productivity all down the line. Perhaps your plant, too, can make profitable use of Logan Conveyors. If you have a handling problem, write today to...

Logan Conveyors

LOGAN CO., INC., 535 CABEL ST., LOUISVILLE, KY.

Lean Year for Scrap

From alltime high to virtual standstill because of strike. Total for 1949 near peacetime

DECREASED demand from steel mills and foundries and the steel strike resulted in fewer articles of iron and steel being consigned to the scrap heap in 1949 than in any year since 1946. Consumption of purchased iron and steel scrap declined to about 21,250,000 gross tons in the year just ended, says Edwin C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc., Washington. This total is off 27 per cent from the alltime record of 29.2 million tons melted in 1948.

Other metallics consumed by steel mills and foundries in the manufacture of new iron and steel also suffered reverses, but less so than purchased scrap, Mr. Barringer says. Consumption of home scrap in 1949 is estimated at 24.5 million tons or down 16 per cent from 1948. Melt of pig iron at 47.3 million tons declined 16 per cent.

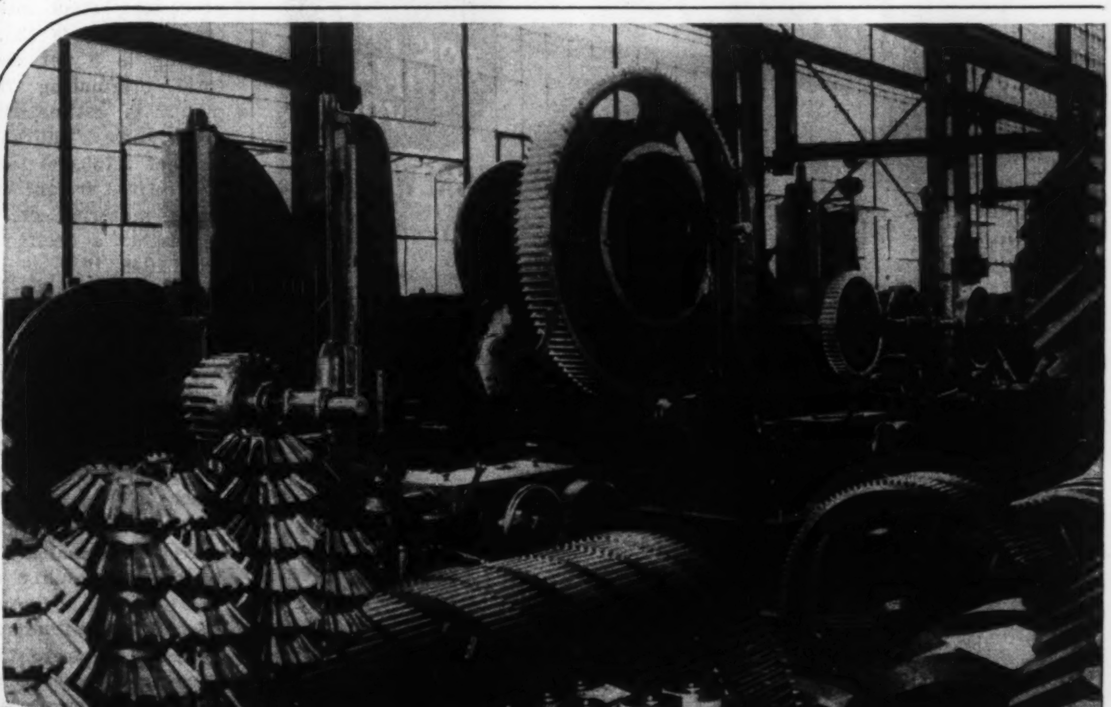
Total use of metallics of all kinds —both purchased and home scrap and pig iron—is estimated at 93,070,000 gross tons, as compared with 112.3 million tons in 1948, a drop of 17 per cent.

In practically every month during 1949 the use of home scrap exceeded the melt of purchased scrap. Pig iron in turn exceeded both grades of scrap combined. This condition was the reverse of wartime experience but is characteristic of a declining market.

Inventory Drop—Consumers' inventories of purchased scrap declined from 4 million tons at the start of the year to about 2,750,000 tons at year's end. Stocks of home scrap remained constant at about 1,375,000 tons and pig iron stocks practically doubled to reach 2 million tons at the end of the year. Dealers' scrap stock increased to at least 500,000 tons by the year's end.

Thus the total visible supply of metallics at the end of 1949 was about 6.5 million tons. At the time of Pearl Harbor it was 5.5 million tons; prewar in 1939 and 1940 it stayed about 10 million tons.

The 1949 purchased scrap total of 21,250,000 gross tons was made up in the following manner: New purchased scrap from domestic sources aggregated 19,750,000 tons; imports at 1,050,000 tons exceeded imports of 500,000 tons and yielded an additional 550,000 tons; consumers drew on inventories for 1,250,000 tons; and



GEARS *of* NELOY *and Neloy Molybdenum for a great diversity of Industrial Machines . . .*

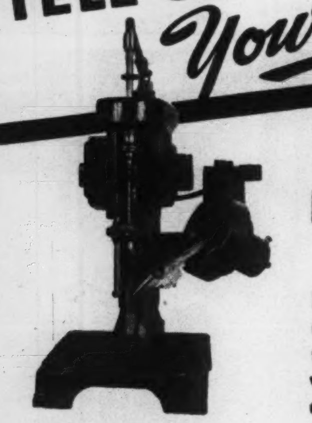
NE

The requirements for diversified heavy industrial Gear Drives in most types of machines are met with Neloy and Neloy Moly Alloy Gear Steels, furnished complete by National Erie Corporation. Drives for billet shears, high speed presses, forging machinery, over-head traveling cranes, power shovels, draglines, to name only a few classes of heavy industrial machines, require NE Alloy Steels, liquid quenched, because the resistance of these steels to impact is at least three times that of ordinary untreated gears. Desired hardness and increased strength result from a combination of alloying and special hardening carefully controlled by National Erie metallurgists. Gear drives cut from Neloy and Neloy Moly Alloy castings meet with outstanding success. Their long resistance to wear and inherent toughness in rough going are of first importance to builders of heavy industrial production equipment. Write for bulletin No. 9 giving full technical details.

NATIONAL ERIE CORPORATION

ERIE, PENNSYLVANIA • U. S. A.

NE


TELL US Your Problems

SEND SAMPLES FOR FREE ESTIMATES NOW!

We have a

DETROIT POWER SCREWDRIVER

to Fit Your Needs

Discard the out-of-date, slow hand method of driving screws. . .Do it this speedy, time and labor saving way that will boost your production and bring costs down.

Cash in on its advantages like thousands of other manufacturers are doing . . .Start with the new year. We can make

IMMEDIATE SHIPMENT

on certain models. Detroit Power Screwdrivers are hopper-fed and furnished in three models. . .Will drive all types of screws, as fast as one a second. . . All driven to uniform tension. . .Will not strip threads or mar heads.

Model A

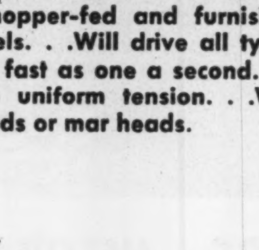
A sensitive but sturdy machine for driving small screws in delicate assemblies. Capacity, No. 2 to No. 6 screws. Both bench and pedestal types. Designed for maximum service, easy operation and speed.

Model B

A real production machine designed for constant service. It drives a range of screws of all types from No. 6 to 1/4" diameter, up to 2" length. Both bench pedestal types.

Model C

A powerful machine for heavy-duty assembly work. Every part husky enough to stand driving hardened cap screws to a tension of 50 foot pounds. Capacity, 1/4" to 5/8" diameter screws.


Write for Catalog

SEND SAMPLE ASSEMBLIES FOR ESTIMATE

DETROIT POWER SCREWDRIVER CO.

2811 W. FORT ST.
DETROIT 16, MICH.

dealers' stocks rose by about 300,000 tons.

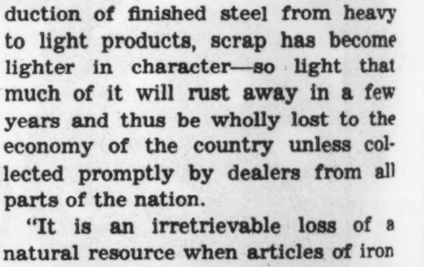
Industrial Tonnage—Inasmuch as average metal loss in machining, stamping, fabricating and otherwise processing steel into consumer and capital goods is 13 per cent and in casting is 5 per cent, 1949's scrap total originating in metalworking plants is estimated at 6.4 million gross tons. Railroad scrap yielded another 3,750,000 tons from obsolete and retired freight cars, locomotives, track material, etc. This tonnage represents a decline of 500,000 tons from 1948.

This leaves 9.6 million tons of scrap that arose from strictly dealer sources like: Collections from farms, auto wrecking, shipbreaking and demolition of buildings. Dealers collect, prepare to specification size and ship this collected scrap to steel mills and foundries in addition to handling most of the factory and railroad scrap.

Not a Permanent Reservoir—"Due to the availability of replacements, the potential of scrap was increased in 1949 more than the tonnage that actually came to the market," Mr. Barringer points out. "Contrary to the general impression, much of the scrap that became available but was not collected will not remain indefinitely as an invisible reservoir.

"Reflecting the trend in the production of finished steel from heavy to light products, scrap has become lighter in character—so light that much of it will rust away in a few years and thus be wholly lost to the economy of the country unless collected promptly by dealers from all parts of the nation.

"It is an irretrievable loss of a natural resource when articles of iron and steel (other than tin cans) rust



LISTEN—NO NOISE!: Intelligible, two-way conversation between a quiet and noisy location can be carried on effectively when employing the latest intercommunication aid reported by Executone Inc., New York. Sound proof booth is adaptable to several makes of intercom systems, absorbing high percentage of background shop noises away. Prudent regard for the future supply of metallics calls for greater utilization of scrap."

Price of scrap to steel mills in 1949 shrank back to OPA levels and in some cases even lower but made a modest recovery in the closing months of the year. On the whole, prices to consumers were slightly more than half of the top of the market in 1948.

Mr. Barringer says the scrap market in 1950 depends wholly on the rate of operations in steel mills and foundries but, on the whole, should be better than in 1949.

How To Select Your Elevator

MEANS of integrating the selection of freight elevators with the material handling problem are covered in a 44-page buyer's guide on that type of equipment, published by Westinghouse Electric Corp.'s Elevator Division, Jersey City, N. J. Ten illustrated sections of the booklet explain the basic considerations involved when selecting freight elevators and component parts.

According to the company, each freight elevator installation usually involves a special elevator engineering study. The actual installation must be based on this study and precise engineering, as it is of major importance to the specific material flow demands of individual buildings and industries. As there is no well-defined pattern for freight elevators and the uses to which they are put vary over a wide range, selection should be based on an analysis of the actual cycle of operation required and the immediate and probable future requirements. Consideration also should be given to the increasing use of power trucks for placing skidded or palletized materials on the car.

Although all modern freight elevators are of the traction type which incorporates multiple hoist ropes passing over a driving sheave on the machine, it is necessary to determine whether the geared type for speeds of 200 feet per minute or less or the gearless type for speeds above 200 feet per minute, is required. Another important factor to be considered, Westinghouse states, is the type of control to be used, whether it be the variable voltage type or the alternating current rheostatic type. Various control accessories, such as inductor stopping devices and releveling inductors, are offered.

In order to determine elevator lifting capacity and size, it is necessary to understand the building characteristics, such as number of floors, floor heights, and number of floors requir-

CLARK

"Clark fork-lift truck saving 96 man-hours a week on one operation"

Mounting costs and pressure for greater economy have led many businesses to profitable employment of Clark Methods of Materials Handling. For example:

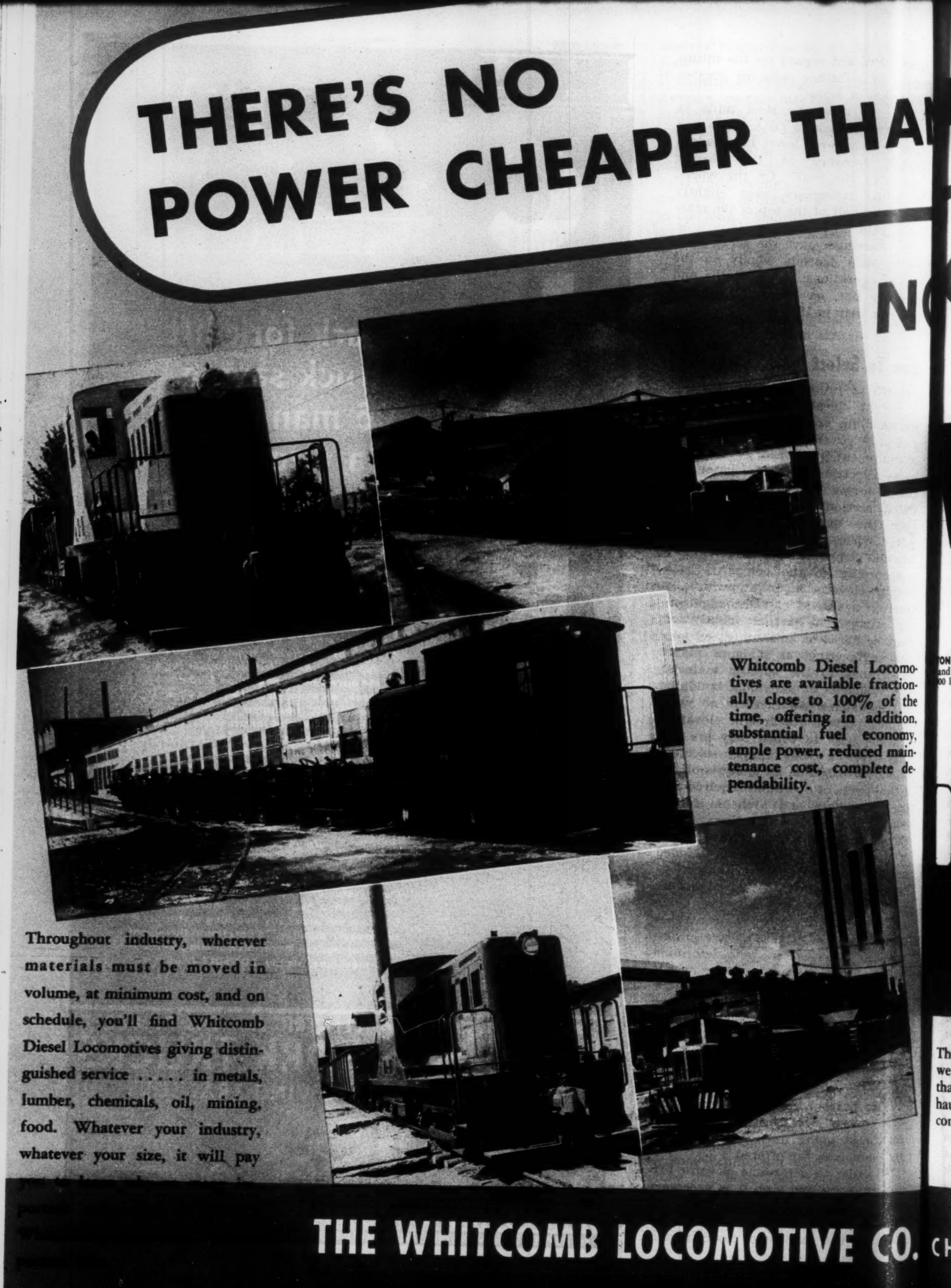
"When movement of coal from outside storage and stoking of the furnaces involved mounting costs that finally exceeded our budget for the operation by more than $100 per week, we assigned to the job a Clark Yardlift-40, equipped with a 15-cubic-foot shovel attachment. Immediately costs fell below budget allowance. Running 24 hours a day, this fork-lift truck averages a savings of 96 man hours per week on this one operation. We are enthusiastically satisfied."

F. R. Sindecuse, Director of Purchasing,
Union Steel Products Company,
Albion, Michigan

This is typical of many letters written by Clark customers expressing their satisfaction—satisfaction that can be shared by any business not presently handling materials in the modern manner. To determine the worth to you of modern Materials Handling methods and machines, simply CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 24 MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS



THERE'S NO POWER CHEAPER THA

Whitcomb Diesel Locomotives are available fractionally close to 100% of the time, offering in addition, substantial fuel economy, ample power, reduced maintenance cost, complete dependability.

Throughout industry, wherever materials must be moved in volume, at minimum cost, and on schedule, you'll find Whitcomb Diesel Locomotives giving distinguished service ..... in metals, lumber, chemicals, oil, mining, food. Whatever your industry, whatever your size, it will pay

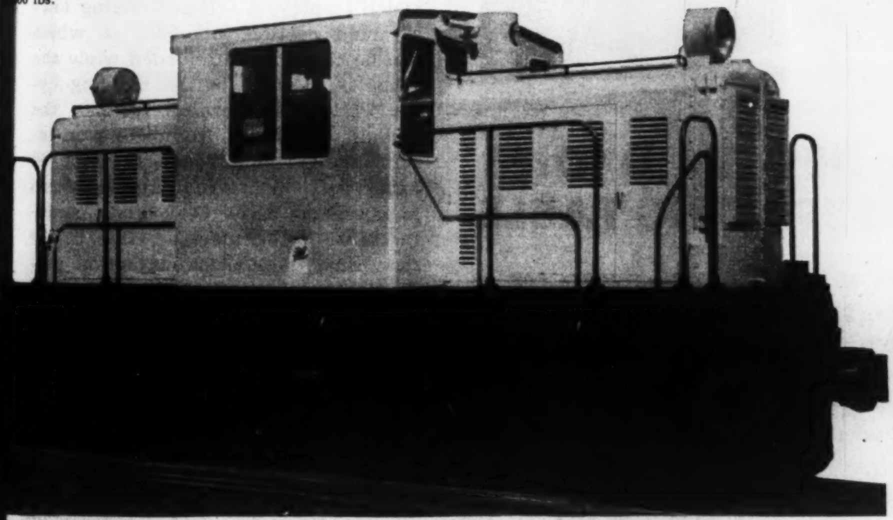
THE WHITCOMB LOCOMOTIVE CO. CH

ESEL...

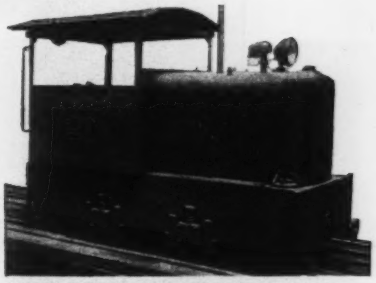
OCOMOTIVE FINER
THAN A WHITCOMB

WHITCOMB
Diesel Electric-Diesel Mechanical
LOCOMOTIVES

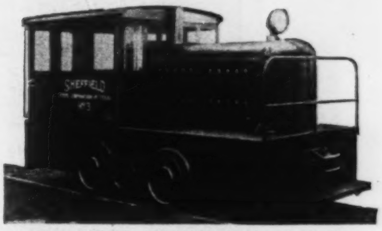
ON DIESEL ELECTRIC, 300 H.P. Gauges
nd up. Maximum T.E. at 25% adhesion,
00 lbs.



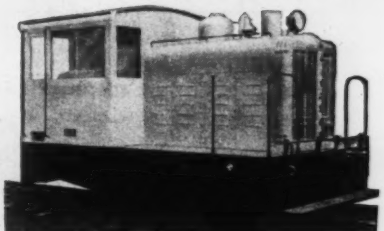
These and many other Diesel locomotives are available in various sizes, weights and gauges from 3 to 95 tons. The Whitcomb line is so extensive that it enables you to select that particular locomotive that fits your specific haulage needs. Write for sales literature illustrating and describing Whitcomb Diesel electric and Diesel mechanical locomotives from 3 to 80 tons.



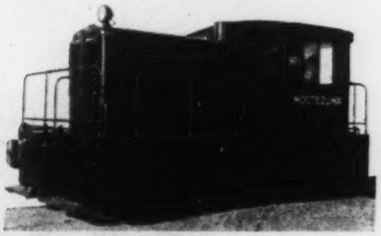
5-TON DIESEL MECHANICAL, 39 H.P. or 47 H.P. Gauges 20" to 42". Maximum T.E. 25% adhesion, 2,500 lbs. in low gear.



10-TON DIESEL MECHANICAL, 98 H.P. or 104 H.P. Gauges 23⅝" and up. Maximum T.E. 25% adhesion, 5000 lbs. in low gear.

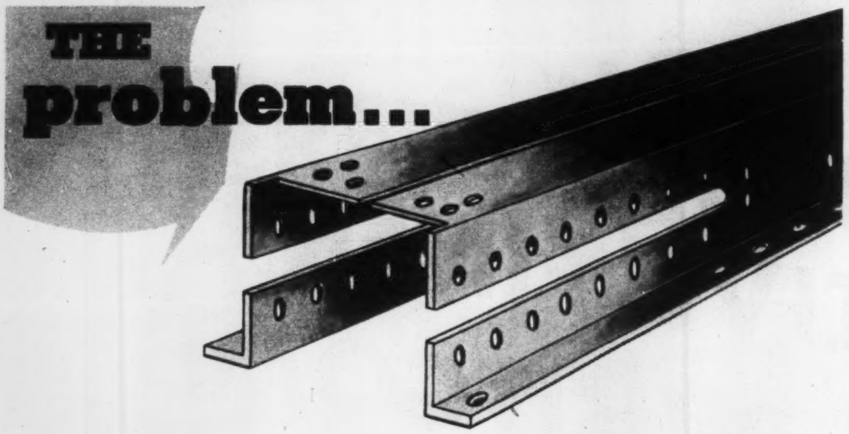


20-TON DIESEL MECHANICAL, 150 H.P. Gauges 30" and up. Maximum T.E. at 25% adhesion, 10,000 lbs. in low gear.

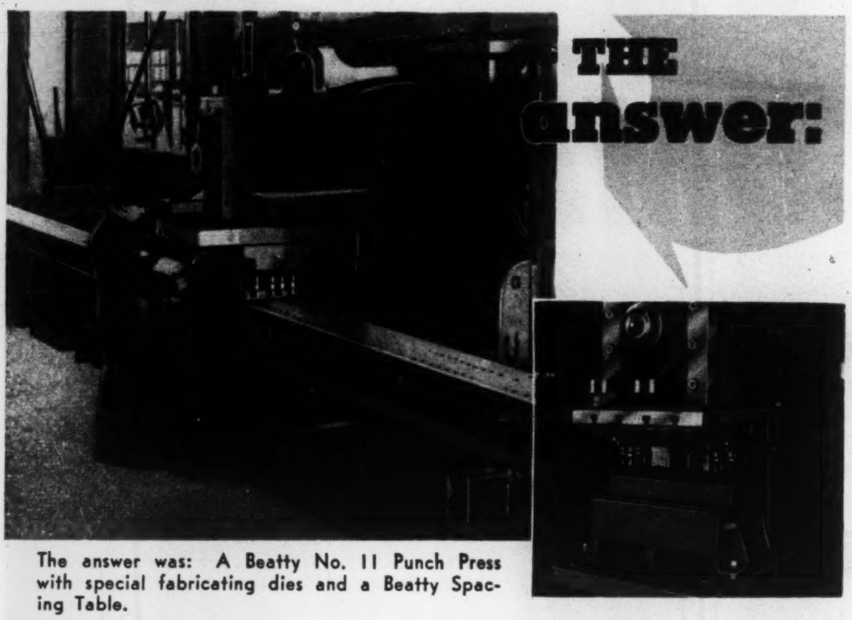


35-TON DIESEL ELECTRIC, 240 H.P. Gauges 30" and up. Maximum T.E. at 25% adhesion, 17,500 lbs.

CHELLE, ILLINOIS *Subsidiary of Baldwin Locomotive Works*



The problem was: How to reduce the cost of fabricating center sills for railroad freight cars.



The answer was: A Beatty No. 11 Punch Press with special fabricating dies and a Beatty Spacing Table.

SPECIAL BEATTY DESIGNED DIES
BEATTY PUNCH and SPACING TABLE

The above example is typical of how Beatty engineers can solve specific fabricating problems, providing faster, lower-cost production. Write us, if you have a specific fabricating problem — punching, forming, drawing, bending, shearing. Let us work with your engineers on your next problem. Two heads are better than one, especially when they're looking for the same thing — *a better way to do it.*

Write for details on Beatty problem-solving equipment.

THERE'S A BETTER WAY TO DO IT!

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

ing front and rear elevator entrances; distance from first floor to top floor; structural conditions, including supporting the elevator and elevator space requirements. Elevator loads and methods of loading also are important factors. Included in this section of the booklet are several tables and illustrations which clearly show the recommended capacity and loadings for various sizes of elevator platforms and standard car openings.

The booklet devotes sections to the determination of elevator speed requirements, the various types of elevator control and the methods of operations, including collective control, single automatic control, car switch self-leveling control, car switch control and continuous pressure control. Elevator car layouts and methods of determining type of door operation, whether it be manual or power operated, are covered.

A considerable section of the booklet is devoted to examples of freight elevator applications, each with characteristics peculiar to a certain installation. Concluding sections of the booklet present budget price data for various types of elevators with various speeds, sizes, controls, doors and means of operation.

Plastic Parts Made Rapidly

PLASTIC products may be molded by an automatic injection machine which employs a self-positioning lower mold section, one-half of which can be cleared and reloaded while the other is engaged in the molding cycle. A single operator handles the loading, cycling and unloading on insert work which formerly required extra personnel. According to Moslo Machinery Co. of Cleveland, manufacturer of the machine, this is the first time the continuous action production has been applied to this type of molding. First reported application of the machine is for the production of molded cord plugs, switch bases and outlets in the electrical industry.

Called the Duplimatic, the machine is built with a hydraulically operated rapid-traverse bed. The lower mold section, twice the size of the upper section, has a complete duplicate set of cavities and is mounted on the automatic positioning bed.

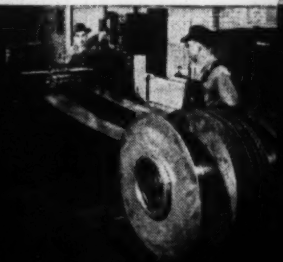
One-half of lower mold section is exposed to ready access by the operator. The injection and clamping head has a compact vertical cross-section which allows generous clearance at each side, this making possible quick and careful loading of insert parts into the idle set of cavities. Inserts may be locked securely for accurate

K
H
P

cold rolled strip
hot rolled strip
shim steel
cold rolled flat wire
electrical sheets
tin plate
sheet steel
tempered and polished spring steel
annealed spring steel
tempered feeler gauge steel
seamless and welded steel tubing
carbon, alloy and stainless tubing
cold finished bars
drill rod
aluminum sheet and strip
extruded aluminum and magnesium tubing
rolled magnesium plate
edge rolling and straightening
slitting and shearing

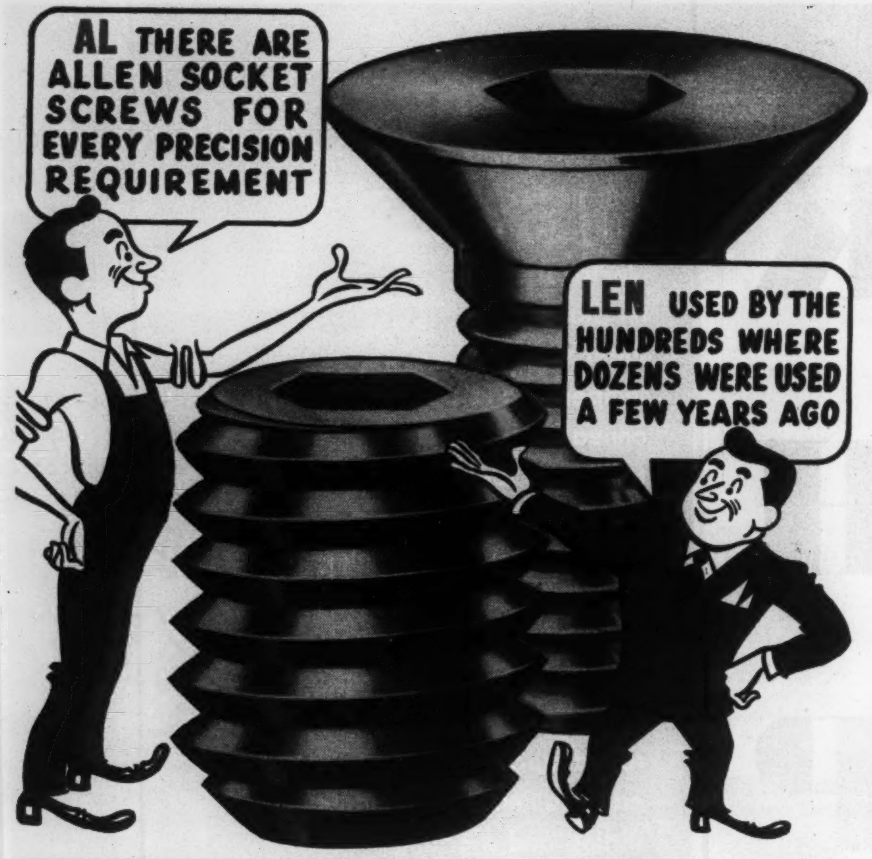
KHP has erected one of the finest and most up-to-date steel warehouses in the country. One hundred thousand square feet entirely under crane—greatly increased facilities for storage and handling—to give you better service sooner. And the cumulative experience of KHP personnel is yours.

KHP STEEL



–we specialize
in slitting
and shearing

KORHUMEL · HEFFRON & PREISS STEEL CO.
2428 OAKTON STREET · EVANSTON, ILLINOIS · AMbassador 2-6700
WAREHOUSES: MINNEAPOLIS · MILWAUKEE · MT. VERNON, N.Y.
SALES OFFICES: DETROIT · ST. LOUIS · LOS ANGELES


AL THERE ARE ALLEN SOCKET SCREWS FOR EVERY PRECISION REQUIREMENT
LEN USED BY THE HUNDREDS WHERE DOZENS WERE USED A FEW YEARS AGO

IF YOUR WORK INVOLVES ONE OF THESE FASTENING PROBLEMS

☐ Vibration	☐ Tighter Gripping	☐ Fast Assembly
☐ Strain	☐ Serviceability	☐ Non-slip Driving
☐ Protrusion	☐ Long Wear	☐ Reduced Weight
☐ Appearance	☐ Precision Fit	☐ Better Balance
☐ Close Spacing	☐ Accessibility	☐ Special Metals & Alloys

Look to ALLEN HEAD SCREWS for the answer

Write us direct for the "Allen Story" on any of the important fastening problems listed above.

WARNING
Allen-TYPE screws aren't necessarily Allen-MADE. Be sure to get genuine ALLENS. SOLD ONLY THROUGH LEADING DISTRIBUTORS

HAVE YOU TRIED . . .
ALLEN SQUARE HEAD SET SCREWS
Where socket heads are not required for safety and convenience, Allen offers a high quality, super-strength square head screw in a broad range of standard sizes.

ALLEN
ALLEN HEAD
Hartford 2, Connecticut, U. S. A.
NEW YORK, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES
48-164

alignment and to prevent dislocation which might damage the mold, the company states.

Once all inserts are placed and locked, operator presses two control buttons which shift the mold and set the automatic cycle in action. Unless both hands are in the safety position, the mold cannot be closed. Hydraulic action moves the lower section into position, the loaded cavities being accurately aligned with the upper section. Once the mold is closed, the metered injection charge is shot and timed. The timing, pressure and quantity of plastic in the charge may be adjusted accurately through accessible controls.

Injection and curing is completed by the time all inserts are in position and the next cycle may be started immediately. It is reported that nylon and vinyls are included in the variety of thermoplastics handled by the machine, which is made in 2, 3 and 4-ounce capacities with casting areas from 20 to 40 square inches.

Prospects Bright for 1950

PROSPEROUS business year ahead is predicted by Irving Grombacher, president, Royal Metal Mfg. Co., Chicago. The company is expanding its manufacturing facilities and is preparing to enter the export market in

"MIKING A SLICE" OF TURBINE: Four-row "slice" of 22-foot diameter, low-pressure exhaust element for an 1800-rpm condensing tandem compound impulse reaction steam turbine—one of the largest Allis-Chalmers units of its kind since the war—gets a micrometer checking. Large blades, foreground, are destined to direct steam at a speed of 600 mph on its way to nearly complete vacuum at 85° F even though it enters the turbine at 1250 pounds per square inch at about 1000° F a second earlier the spring. Mr. Grombacher sees a 15 per cent increase in sales which would be higher still if the company could meet demand.

Sales in 1949 were up about 95 per cent over 1941, the best prewar year. Biggest increases were in office equipment and in the contract division. In 1950 the firm will devote more materials to school and hospital equipment because it expects expansion to continue for ten years.

Royal Metal is expanding its manufacturing facilities both in the United States and Canada. A warehouse is being added at the company's main plant in Michigan City, Ind., and a building to house sales and general offices is being added in Preston, Ont., in order to release more manufacturing space.

Lightweight Cars Increase

POSTWAR lightweight railroad cars built for domestic railroads would form a railroad train 400 miles long, estimates the American Iron & Steel Institute. It would be made up of more than 41,000 new freight cars, nearly all owing their lightness to low alloy steels, and about 2200 passenger cars built largely of low alloy and stainless steels.

Use of high strength steels or light nonferrous metals has reduced the empty weight of the new freight cars. This method of construction makes for lighter cars without reduction in load capacity or even with some increase in capacity, safety and length

In the last three years 41,303 cars have been built with the use of high strength steel in varying amounts from less than 2 tons per car to more than 17 tons. This total number is a little over 18 per cent of the freight cars delivered to the railroads in this period, compared with 8 per cent of the new cars in 1937. A weight reduction of 15 to 20 per cent is possible with use of alloy steel.

Lightweight construction has been adopted more widely in passenger train cars than in freight cars. In the last 15 years more than 5200 passenger train cars have been built for domestic use and nearly all of them have been lightweight. This number is equivalent to more than 10 per cent of the cars in use in 1948.

Through the use of alloy and stainless steels and other high strength metals the weight of new coaches has been cut to around 50 tons each, compared with 70 tons in the old cars. Sleeping cars have been reduced from 80 to 60 tons. These differences account also for the change from six-wheel trucks to four wheels. Part of the weight reduction in car bodies has been offset by added accessories.

NOW - Nylon Eyecups

for Safety Goggles

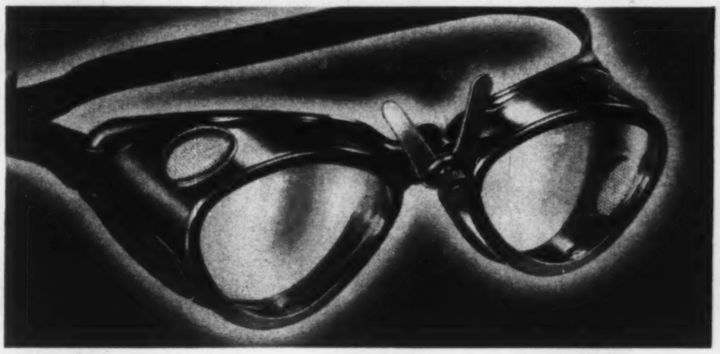
Greater Comfort
Greater Vision
Greater Strength

Style L1

Nylon cups fitted with WILLSON-WELD* lenses for gas welding. Indirect ventilation reduces flash and glare hazard.

Style L2

Nylon cups fitted with WILLSON Super-Tough* lenses for chipping, snagging and other heavy duty operations. Cups are well ventilated to reduce fogging.



For the protection of your workers' eyes—and *your* profits, WILLSON offers this new development in safety goggles. Eyecups of NYLON combine unusual strength with exceptionally wide vision. Yet they are lighter than other heavy duty goggles, contributing to comfort which is a must in getting safety equipment worn.

Extra wide vision is provided by the triangular lens shape, an exclusive WILLSON feature. The adjustable nose bridge and rolled edges of the eyecups assure good fit around the eyes while the adjustable elastic headband is adaptable to all head sizes.

® WILLSON
"Established 1870"

NEW CATALOG *In addition to product information, it contains information on safety glass, filter glass, respiratory hazards, etc., which will help you select proper safety equipment to meet specific hazards. Send for it!*

WILLSON PRODUCTS, INC., 233 WASHINGTON STREET, READING, PENNA.

Now every shop can have the advantages of

BAND SAWING

The new WELLS

Model 49 A

METAL CUTTING BAND SAW

No longer does any shop need be without the advantages of band sawing for metal cut-off work. The new Wells Model 49A fits the smallest shop's budget, yet it does a man-sized job in any plant. From its welded steel frame to its tubular steel base, the Wells Model 49A is a rugged shop tool that will give long, dependable service. Its portability is unequalled. Easy to operate without special training, the Model 49A can be used by anyone in the shop. Automatic shut-off at the end of the cut eliminates the need for the operator to stand by. The continuous cutting action, utilizing every tooth of the band saw blade, means more economical cutting too. Write for complete details, today.

DESIGN DETAILS

Capacity: Rectangular, 3½" x 6⅝"; Rounds, 3½" diameter.
Blade: Size—½" x .025" x 5'
Motor: 1/6 HP, Ball Bearing—foot mounting.
Speeds: Selective (belt change) 54, 100, 190 f.p.m.
Drive: "V" Belt.
Vise: Quick action.
Blade Guides: Stationary brackets with adjustable blade guides.
Wheels: Disc type idler and drive wheels, mounted on grease-sealed ball bearings.
Blade Tension: Incorporated in frame design.
Switch: Manual — automatic stop.
Height to top of Bed: 24"
Bed Area: 6½" x 24"
Floor Space: 16½" x 38"
Net Weight: Approx. 118 lbs.

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

Steel Production See Saws

Consumption of purchased metal in 1949 down 29.2 per cent from 1948 alltime record

STEEL industry ran the gamut of production, from the loftiest point ever attained to one of its lowest recorded depths, in making 77 million tons of steel during 1949. It was the third largest annual output for peacetime uses.

Industry's steelmaking furnaces have now poured about 341 million tons in a little more than four years since the war ended, or within 10 per cent of the amount made in all of the 1930s. That great surge of production was achieved despite two paralyzing steel strikes and numerous interruptions in coal production as well as raw materials shortages and other hindrances.

A strong start appears to be in prospect for 1950, says Walter S. Tower, president, American Iron & Steel Institute. Output in 1949 should send the postwar production total well over 400 million tons.

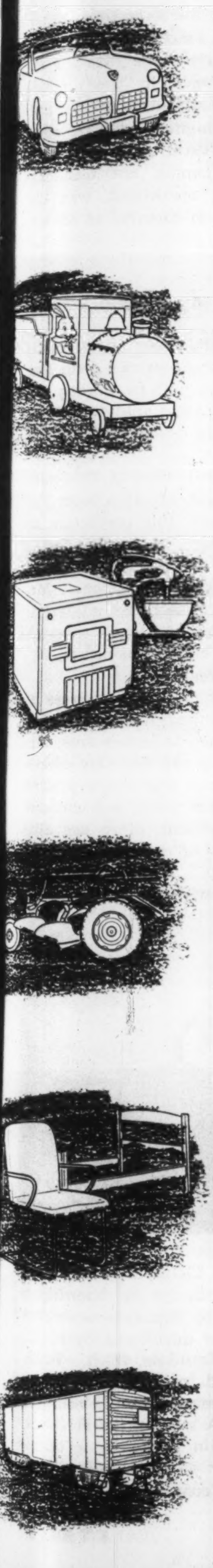
Backlogs High—Steel companies now are reported to have large backlogs of orders as a result of the steel strike in October and early November. But they have more capacity than ever before, as a result of their large scale programs of postwar expansion and improvement. Even if there should be a further sharp increase in the buying of steel, there is not likely to be any continued tightness in supply of most products as long as steel companies are unimpeded in their production. Company expansions have more than kept pace with the increase in demand for steel.

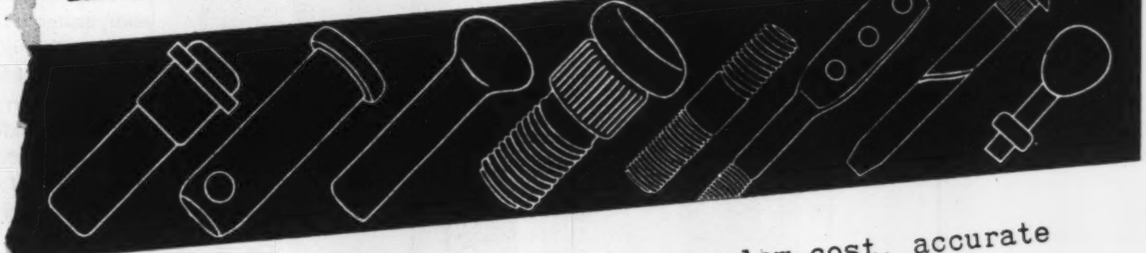
Benefits of those expansion programs were forcefully demonstrated in the first quarter of 1949 when production averaged more than 8 million tons a month for the first time in history. Another impressive feat was the fact that more than 92 million tons of raw steel was produced in the 12 consecutive months ending Apr. 30, 1949. Never before had so much steel been made in a like period in this country.

That tremendous output stilled the dire predictions about shortages, and enabled the production of homes, automobiles and other items to surpass records that had stood for 20 years or more.

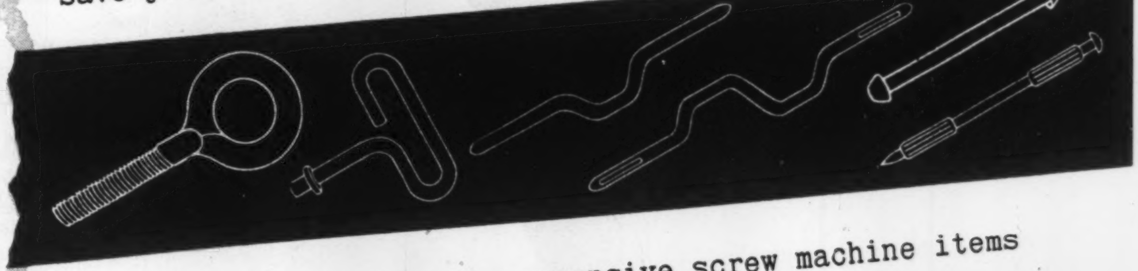
Looking Ahead—In 1950, high costs may be a grave problem for iron and steel companies. Pensions and other benefits to be paid for by the companies will increase costs, although

6

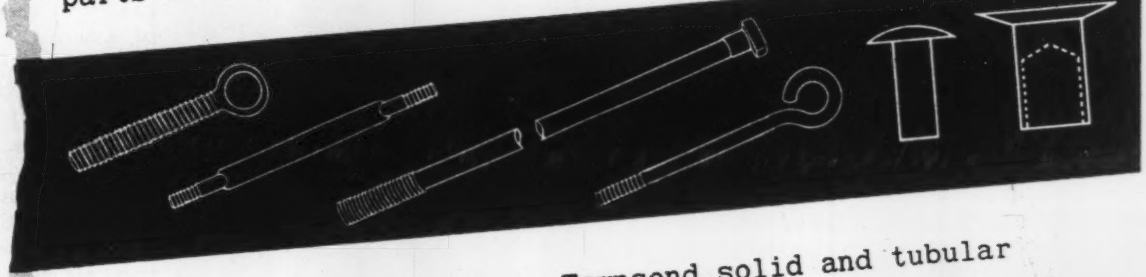




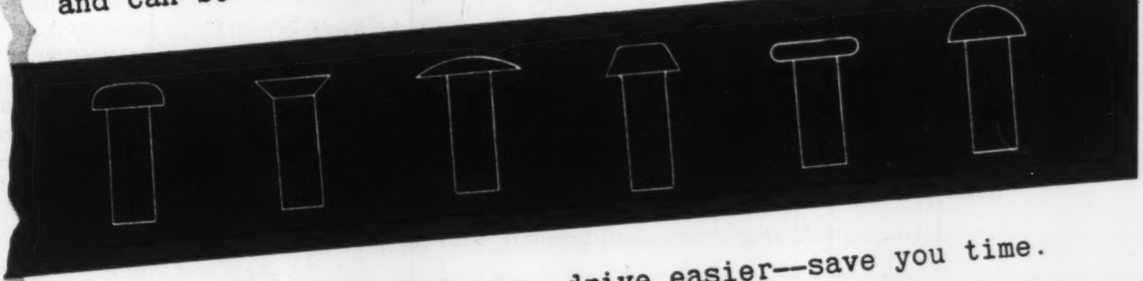
In all industry, Townsend cold-headed parts and fasteners



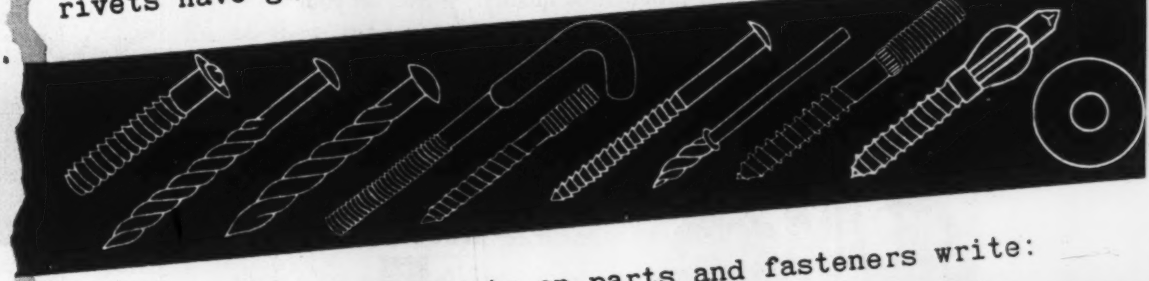
save you time and money. Many find our low-cost, accurate



parts do a better job than expensive screw machine items



and can be obtained quicker. Townsend solid and tubular

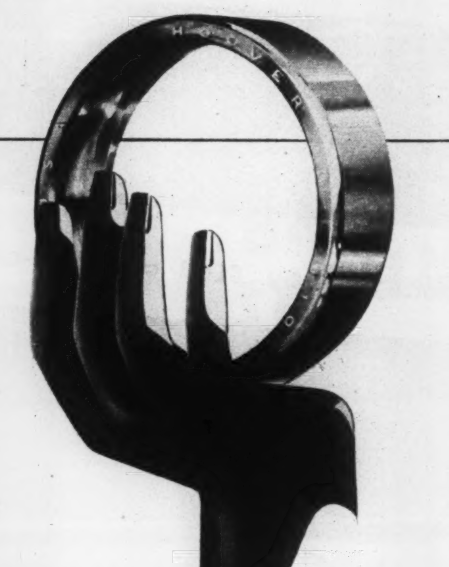


rivets have greater accuracy, drive easier--save you time.

For help in reducing costs on parts and fasteners write:

Townsend
COMPANY — ESTABLISHED 1816

New Brighton, Pa.
Chicago 38, Ill.



HOOVER ***achieves the superb quality of hand honed raceways mechanically***

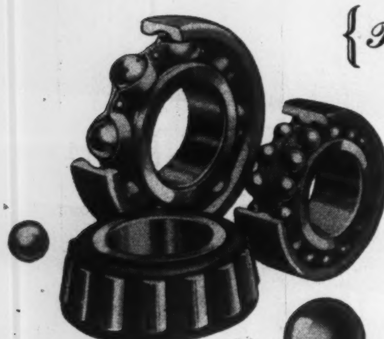
The superior qualities of honed raceways were first realized in costly laboratory samples made by hand to determine just how fine a bearing could be. These samples set new standards of precision and uniformity . . . longer life . . . greater load capacity. It remained for Hoover engineers to develop the specialized machines to achieve hand honed quality mechanically. Now Hoover ball bearings, with the plus values of honed raceways, may be adopted at reasonable cost as standard equipment on all commercial products of quality. Write, on your letterhead, for a copy of the Hoover Engineering Manual.

The Aristocrat of Bearings

HOOVER

AMERICA'S ONLY
BALL BEARING WITH
HONED RACEWAYS

HOOVER BALL AND BEARING CO., ANN ARBOR, MICHIGAN



the impact will vary among individual companies. High cost of replacing plant and equipment has been a serious problem for some time. Other costs also have soared.

Average hourly wage rate for all employees engaged in the production, sale and distribution of iron and steel was the highest ever recorded during 1949. Total payroll of iron and steel companies, not including nonsteelmaking operations, was the second highest in history, at $2 billion.

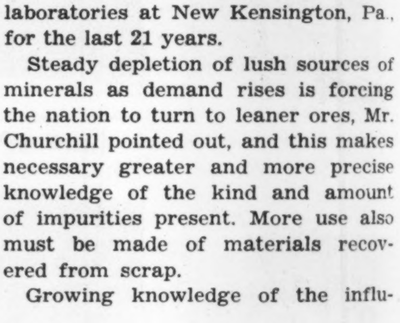
Chemistry Lends a Hand

INCREASED utilization of low-grade ores to replenish America's dwindling mineral supplies will be greatly facilitated by improved analytical techniques now being developed by chemists.

H. V. Churchill, who is the chief analytical chemist of Aluminum Co. of America, made this prediction as he received the 1949 Pittsburgh Award of the American Chemical Society's Pittsburgh section. Mr. Churchill has headed the analytical chemistry division of Alcoa's research laboratories at New Kensington, Pa., for the last 21 years.

Steady depletion of lush sources of minerals as demand rises is forcing the nation to turn to leaner ores, Mr. Churchill pointed out, and this makes necessary greater and more precise knowledge of the kind and amount of impurities present. More use also must be made of materials recovered from scrap.

Growing knowledge of the influ-



CHATTER-FREE CUTS: Heavier cuts and faster speeds on all operations can be made by this new universal lathe tool holder developed by H. C. Clatfelter Co., Ferndale, Mich. Tools can be removed for sharpening without changing their position in relation to the work. A standard drill chuck can be inserted in the holder so operator can power drill and ream from the compound ence of minute concentrations of certain elements upon alloys and compounds has posed another new challenge for the analytical chemist, he said and noted that five-hundredths of 1 per cent of tin in a certain alloy of aluminum increases the yield strength of that alloy by more than 10,000 pounds per square inch. A mere trace of beryllium has a profound effect upon the metallurgical behavior of certain aluminum alloys.

"Here, then is our general prophecy—more accurate analysis, more precise analysis, more rapid analysis are sure and certain to be realized in the future," Mr. Churchill said.

As far as speed is concerned, great gains already have been made, he continued, adding that the importance of speed "cannot be overemphasized in a private-enterprise, profit-motive economy such as we try to preserve in this country of ours."

For example, about five million separate analytical determinations a year are needed to carry out the widespread activities of Aluminum Co. alone, he reported, and when the time for each determination is reduced by only 1 minute, a saving of 83,333 hours, or 10,000 man days, is obtained.

Speeds Unloading

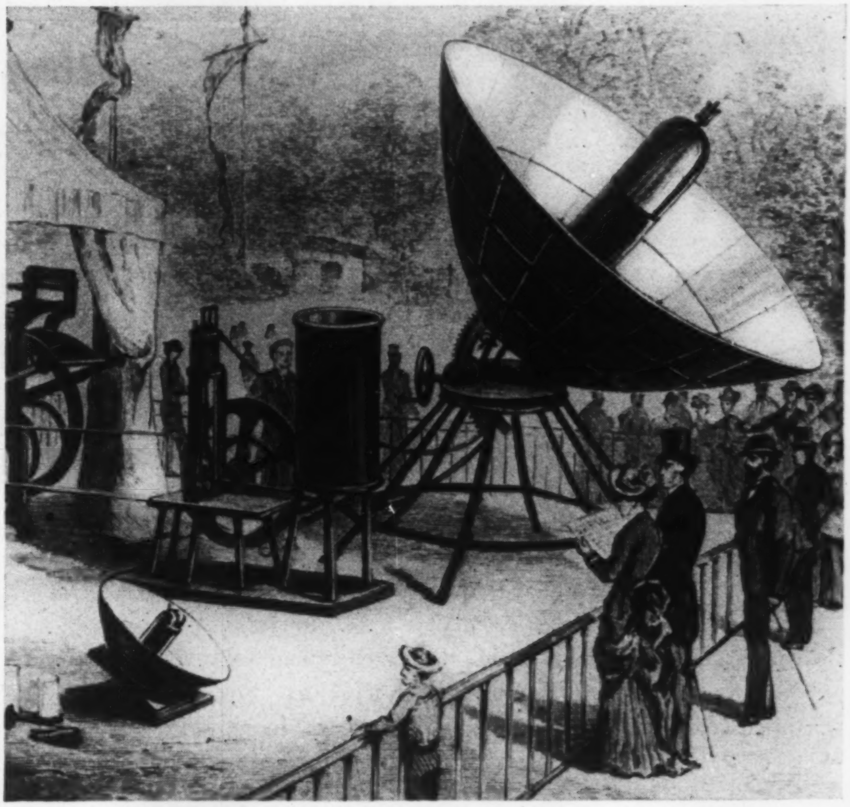
ELIMINATION of much of the drudgery encountered in emptying railroad cars is now possible by use of a new car shaker produced by American Engineering Co., Philadelphia. By use of the device emptying cars is now easy work for one man in a matter of minutes instead of the previous drudgery for two to six men in from 2 to 6 hours.

New device provides a fast, easy way to unload coal, ores, sand, cinders, rock, coke, slag, wood chips, limestone, clay or any other loose materials from open hopper-bottom type cars.

Container Volume High

PHYSICAL volume of container business in 1949 was near 1948's high level and outlook for the spring of 1950 is good, says the Commerce Department. Demand picked up in the third and fourth quarters of 1949 after having slackened in the four preceding months.

More container users became increasingly conscious of the need for distinctive packaging in 1949. It is expected users will demand more attractive packages to stimulate consumer interest in their products during the coming year.



Mouchot, a Frenchman, invented this sun-powered generator that ran a printing press.
THE BETTMANN ARCHIVE

Mouchot Trapped the Sun's Hidden Horsepower

For centuries the possibility of harnessing solar energy has tickled the fancy of inventors. Countless contraptions for converting the sun's rays into usable energy have been reported, but so far all of these sun-powered machines have proved impractical.

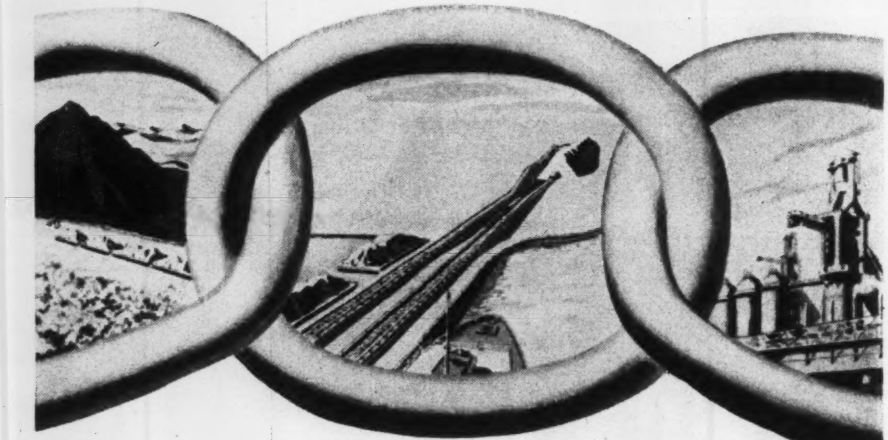
Some genius actually *may* find a practical means of transmitting the sun's power to a turning shaft. But for use with today's machines, there's no need to wait for any genius to create more efficient power transmission devices.

For 31 years the Twin Disc Clutch Company has perfected and produced advanced, yet *practical* solutions to every kind of power transmission problem . . . in all types of construction, petroleum, lumber and farm equipment, and in the marine and machine tool fields. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

Power Take-off
Hydraulic Torque Converter
Machine Tool Clutch

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918



Now *Steel* forms a mighty link . . . uniting the two Americas

North America needed additional sources of iron ore to feed her hungry blast furnaces. South America had that ore. For example, up the Orinoco River valley, in Venezuela, there is a huge mountain of it.

Which brought up the problem: how to assure a smooth flow of that ore from the valley of the shallow Orinoco to the waiting blast furnaces oceans away. Getting it 200 miles down the river was relatively simple—it came in flat-bottom barges. But transferring the ore to ocean-going vessels—and seeing that there was always an abundant supply on hand—was a problem calling for skilled engineering.

Hewitt-Robins was called in. Soon, a huge ore storage and trans-shipping station will be in busy operation. Long lines of speeding Hewitt-Robins belt conveyors will take the ore from the barges and neatly stack it in huge storage piles—piles that will reach an eventual capacity of 1,066,000 gross tons (more than *two billion* pounds). As the ocean-going vessels arrive, their 24,000-ton holds will be filled in a brief eight hours by other Hewitt-Robins belt conveyors.

Thus, the ample ore supplies of the southern hemisphere will fill the hungry blast furnaces up north . . . to form a link of steel uniting the two Americas.

This great ore-handling project is another example of a difficult materials-handling problem solved by Hewitt-Robins. It typifies how the three Hewitt-Robins industrial divisions work closely as a unit: Robins Engineers, designing and engineering; Hewitt Rubber Division, supplying the conveyor belting; Robins Conveyors Division, providing the conveyor machinery.

* * *

The services and products of these three divisions are available—separately or collectively—to help make your operations more effective and economical.

HEWITT-ROBINS
INCORPORATED

ROBINS ENGINEERS, 157 CHAMBERS ST., N. Y. 7, N. Y.
HEWITT RUBBER DIVISION, BUFFALO 5, N. Y.
ROBINS CONVEYORS DIVISION, PASSAIC, N. J.
HEWITT RESTFOAM DIVISION, BUFFALO 5, N. Y.

Nickel Use Below 1948

Mid-year slump drops 1949 consumption 15 per cent below mark set in preceding year

CONSUMPTION of Canadian nickel in all forms was about 15 per cent lower in 1949 than it was in 1948 when a new peacetime record was established. Nickel sales remained high during the early part of 1949 and were comparable to the volumes achieved in the previous year, says Robert C. Stanley, chairman of the board, International Nickel Co. of Canada. Next came a drop in the period May through August, followed by improvement during remainder of the year despite the adverse effect on consumption resulting from the steel and coal strikes.

"The fall in demand for various metals, including nickel, required a reduction of nickel production by International Nickel bringing the rate of the last half of the year to approximately 15 per cent below the previous level," Mr. Stanley explains.

French nickel production, mostly from New Caledonia mines, increased over 1948 but was relatively small compared with the Canadian total. Cuban mines remained closed and no production was reported in 1949. Russia continued to produce nickel but no information is available on its output.

U. S. Lends Consumers—United States again was the largest consumer of Canadian nickel, getting about 65 per cent of the total. United Kingdom took about 20 per cent. Adding Canadian use brings the total for the three countries to 88 per cent. Remainder of Canada's output goes to other countries throughout the world.

Price of nickel in the U. S. remained unchanged throughout 1949. Other world prices were adjusted at the time of the currency devaluations in September to retain parity with U. S. prices.

Use of nickel as a major alloying element by the steel industry accounted for the chief proportion of the metal's consumption. "While total demand for nickel by the steel industry throughout the world decreased during the year by reason of reduced production of alloy steels," Mr. Stanley continues, "the relative percentage employed for alloy engineering steels did not show any appreciable change. The triple alloy steels containing nickel, chromium and molybdenum, continued their popularity in numerous industries for vital machine parts."

New Uses Grow—Low carbon

Hardening

Production up from 14 to 35 per hour, and savings of $82,507 per year on this International Harvester gear.

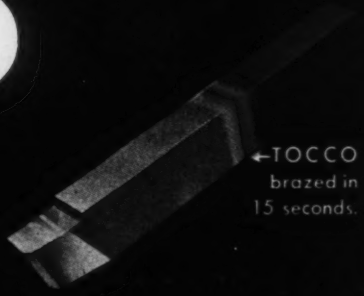
Over 4c saved on every part, 600 parts per hour when Lima-Hamilton TOCCO-hardens these shifting levers.

Hardening costs cut 80% by TOCCO-hardening wearing area of Link Belt Company conveyor trolley wheels.

Brazing

Kennametal, Inc. brazes carbide tips on these mining machine bits and hardens shanks at the same time. Output—one every 20 seconds.

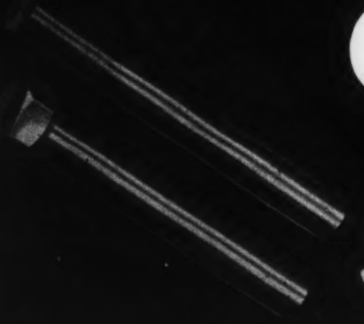
Nash Motors cuts cost 60%, triples hourly output by TOCCO-brazing drain flanges to automotive oil pans.



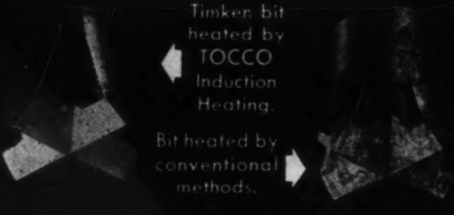
←TOCCO brazed in 15 seconds.

A 6c TOCCO-brazing job saves $17.00 tools—saves $2,000 a month at a midwest automotive parts plant.

Forging



H. M. Harper boosts production up to 265% and die life up to 400% by TOCCO-heating non-ferrous bolt blanks for forging.



Timken bit heated by TOCCO Induction Heating.

Bit heated by conventional methods.

Scale was reduced from 2.79% to .79% by applying TOCCO to heating bar stock for forging rock drill bits at Timken Roller Bearing Company.

3⅜" x 7" x 1" Billet

Tractor track link forging.

Forging die life tripled and scale reduced over 99% when Willy's Overland Commercial Forge Plant installed TOCCO Induction Heating for forging.

All These Jobs, And Probably Some of Yours, Can Be Done Faster, Better and at Lower Cost with TOCCO* Induction Heating

THE OHIO CRANKSHAFT COMPANY

TOCCO

JUST PUSH A BUTTON

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

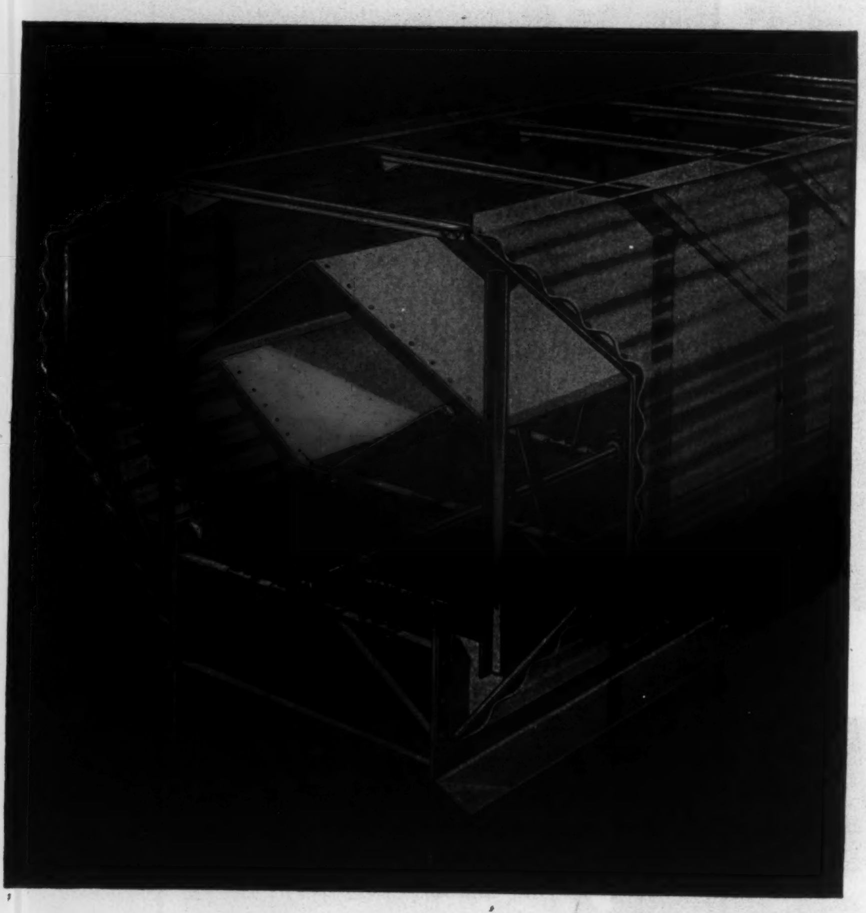
NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-1, Cleveland 1, Ohio

Please send copy of "TOCCO Induction Heating".

Name________________
Position________________
Company________________
Address________________
City________Zone____State______

FOR STEEL MILLS FOUNDRIES, FORGE SHOPS (Heavy Industry)



Adaptable to many applications, the Burt Monovent Continuous Ridge Ventilator is particularly efficient in heavy industry. The Monovent may be installed on any type roof. It removes heat, smoke and fumes the entire length of the building—converts the roof line to a giant exhaust valve. And Monovent's simple, sturdy construction assures long, trouble-free life with almost no maintenance.

The Monovent may be the solution to your ventilating problems. Burt engineers will be glad to help with your plans—without obligation.

SEE SWEET'S OR WRITE FOR CATALOG AND DATA SHEETS

The BURT MFG. Co.

905 S. High St. Akron 11, Ohio, U.S.A.

VENTILATORS • LOUVERS • OIL FILTERS • SHEET METAL SPECIALTIES

per cent nickel steel is gaining popularity. It was developed primarily to meet the need for a medium-priced material suitable for use in construction of oxygen plants and containers for liquefied gases. Several trial low temperature installations using this alloy are being made. Principal uses, however, are in the field of petroleum production to meet corrosive conditions encountered in gas distillate wells. Use of this alloy for sucker rods in corrosive wells is increasing. Another use is for solder rolls in production of tinned containers. In Europe interest has been shown in steels containing from 3 to 8 per cent nickel for low temperature processing in the petro-chemical, plastics and allied industries.

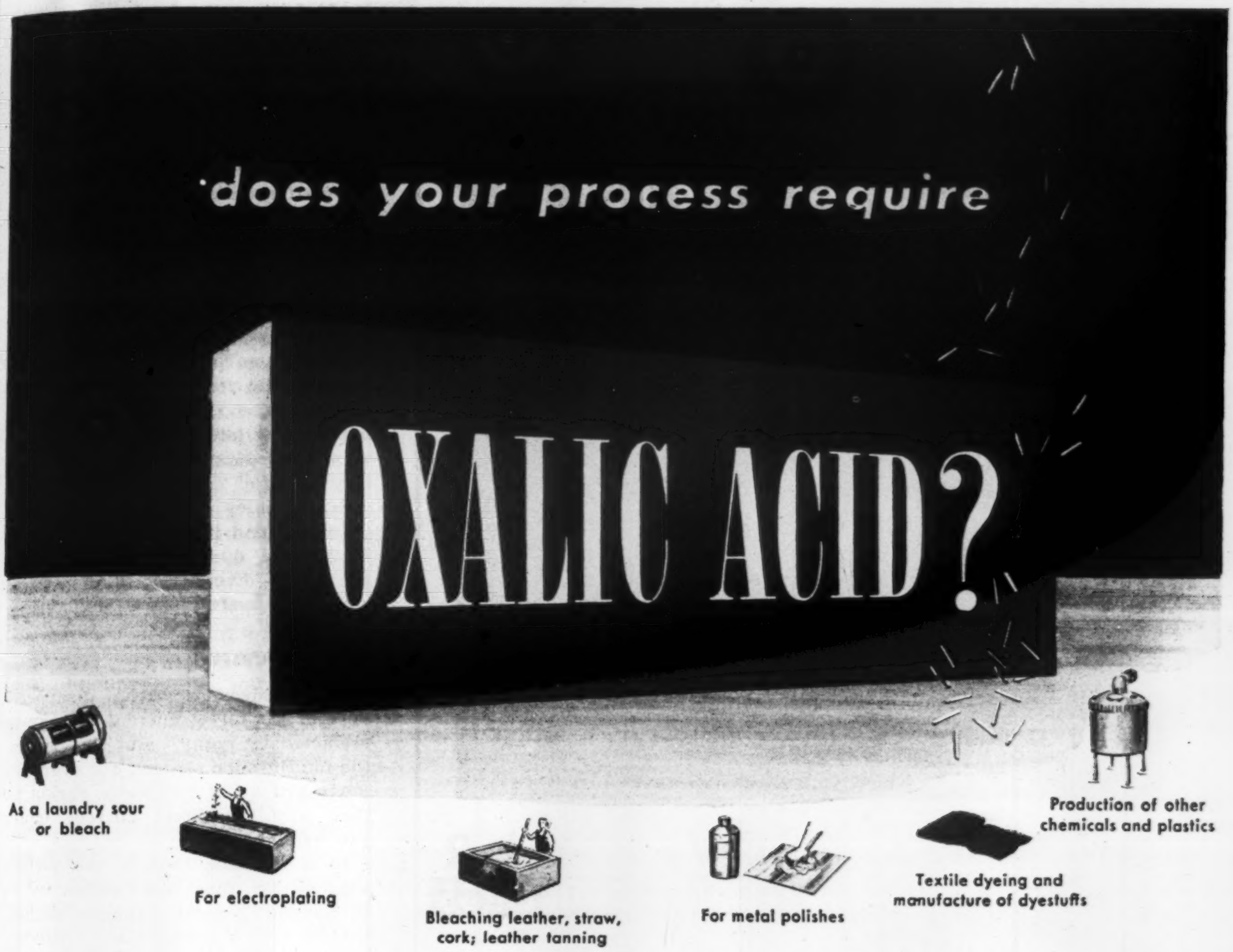
Auto industries in the U. S. and Great Britain continued to be large users of nickel alloy steels for gears, universal joints, bolts, studs and other highly stressed parts of automobiles and trucks. Large tonnages of these steels were also used in the expanding tractor and agricultural implement fields in both countries.

Even though stainless steel demand in 1949 was below 1948, this category accounted for a large portion of the steel industry's consumption. About 60 per cent of the total stainless steels produced in the year just ended were of the chromium-nickel types. Automotive, aircraft and construction industries were large users of stainless steels as were manufacturers and transporters of chemicals, drugs, food products and beverages.

Thrives on Hard Usage—Various high nickel alloys, including Monel and Inconel, were widely used in branches of industry where resistance to corrosion, heat, wear and other destructive conditions is required. Monel continued to lead malleable nickel and other high nickel alloys in cast as well as wrought forms. During the year the American Society of Mechanical Engineers boiler construction code approved the fusion welding of Monel, nickel and Inconel in the construction of unfired pressure vessels. This has resulted in an increase in the use of these materials not only in the power and associated fields but in other industries including chemical.

Nickel-clad steel which is widely used in the U. S. and Canada is gaining popularity in Europe and Australia, particularly for chemical plants. The material has been in demand by British, Swiss, French and Australian firms for equipment in the manufacture of caustic alkalis.

Television industry continued to employ increasing amounts of nickel


does your process require
OXALIC ACID?
As a laundry sour or bleach
For electroplating
Bleaching leather, straw, cork; leather tanning
For metal polishes
Textile dyeing and manufacture of dyestuffs
Production of other chemicals and plastics

GENERAL CHEMICAL—*the reliable, convenient source*

BASIC CHEMICALS
FOR AMERICAN INDUSTRY

Wherever Oxalic Acid is used, General Chemical's product has long been preferred. First, for its purity and the uniformity of its crystal size. Second, for its ready availability from General's network of producing and distributing points in industrial centers from coast to coast.

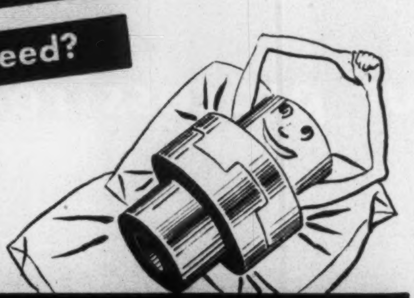
This combination of consistent quality *plus* ready availability contributes much to the efficient and economical operations of many users. It can mean much to you too. For your needs . . . specify General Chemical Oxalic Acid, and be sure!

GRADE: Colorless needle crystals thru 10 mesh. Contains a minimum of 99.5% $C_2H_2O_4 \cdot 2H_2O$

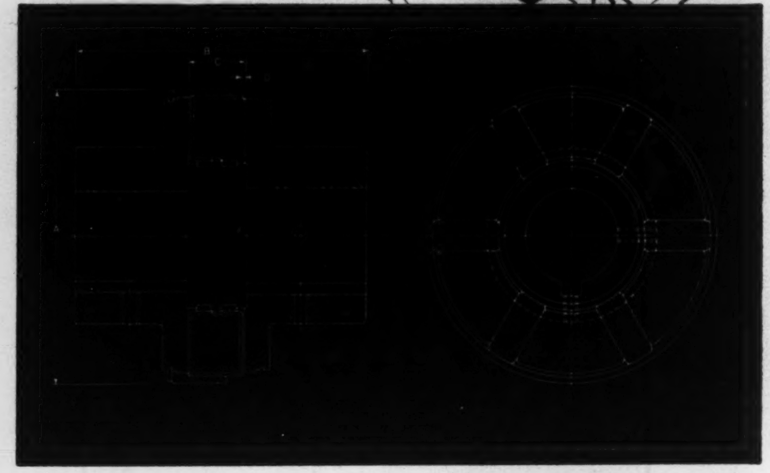
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport
Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Houston
Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh
Portland (Ore.) • Providence • San Francisco • Seattle • St. Louis
Wenatchee and Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

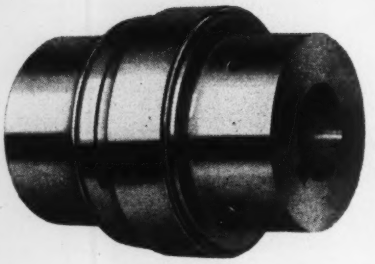
How many cushions do
Your couplings need?



Lovejoy will promptly, without obligation, give the correct answer on your supply of data, h.p., kind and conditions of service.



LOVEJOY L-R
FLEXIBLE COUPLINGS



Lovejoy L-R Type "H" for heavy duty. Electric steel castings, and greater number of jaws provide far greater load capacity. Pat. & Pats. Pend.

Simplified to the last degree! Ruggedly built of most enduring materials! Lovejoy Couplings give longest service with minimum attention. Every duty from 1/6 to 2500 h.p.

- NO LUBRICATIONS
- MAINTENANCE FREE
- NO SHUT-DOWNS FOR CHANGING CUSHIONS

Send for complete Catalog . . .

Selector Charts lead you right to the couplings you need.

Tough, resilient, free-floating load cushions are suspended between metal jaws. Cushions in plain sight, can be removed and replaced in minutes.

Also manufacturers of Lovejoy Variable Speed Transmissions, and Lovejoy Universal Joints.

LOVEJOY FLEXIBLE COUPLING CO.
Manufacturers of Lovejoy Variable Speed Transmissions
5071 W. LAKE ST. • CHICAGO 44, ILLINOIS

and nickel alloys in various parts of transmitting and receiving equipment.

Plating Demand Holds—Automotive industry again lead other industries in the amount of nickel used in plating. Total nickel employed by the plating industry was closer to former consumption peaks than other consumers of primary nickel.

During 1949 Spain began the production of pure nickel 5 peseta coins which will be followed by two other denominations in pure nickel, and thus became the 42nd country to adopt nickel for one or more denominations of coins. Belgium and Israel became the latest countries to begin using cupro-nickel alloy for subsidiary coinage.

Mr. Stanley believes consumption of nickel and its alloys will be well maintained during 1950 because of the broad diversification of uses to which the metal is put in industry.

Still in Demand

FOR two decades virtual disappearance of the direct current motor was predicted by many. But like Hydra, the multiheaded serpent, for every old job taken away two more spring up that only the direct current motor can handle.

In a nutshell, that is the picture painted for this type motor by L. R. Ludwig, general manager, Buffalo Divisions, Westinghouse Electric Corp., Buffalo.

Since the early twenties, he pointed out, the swing to alternating current distribution in plants accelerated. The induction motor began to usurp jobs previously assumed to be the province of the d-c motor. For general purpose, constant-speed work the induction motor is being used more and more, the d-c motor less and less. Now the d-c motor is almost never used if an a-c motor can do the job because a special d-c power source is required.

Prophets Wrong—But, he said, again the prophets were wrong. The d-c motor did not disappear. Instead sale of d-c motors increased by about one half since the early twenties. Furthermore, there is strong evidence that the d-c motor will continue in heavy demand far into the future. Not as a constant-speed motor, but to do those things for which the d-c motor still remains unchallenged—primarily for adjustable and precise speed control.

For every old job taken away, two others appear that only the d-c motor can handle. Pronounced trends in industry for higher speed and for much more exact process control support this situation.

Platinum's Industrial Uses

Top decorative requirements. Rebuilding of European industries boosts consumption

REVIVAL of European markets for platinum metals in 1949 is viewed as outstanding as compared with other postwar years by Dr. Charles Engelhard, president, Baker & Co. Inc., leading dealer and refiner of platinum metals. The reconstruction, modernization and expansion of European facilities for manufacturing various kinds of electrical apparatus and for making rayon, acid and other chemical products required important quantities of platinum and palladium.

In the United States the industrial use of platinum metals for electrical and chemical purposes in 1949 exceeded their uses for jewelry and other decorative articles, he says. During 1949 processing equipment of good size was constructed of platinum, or lined with thin layers of platinum using improved fabricating methods. This type of apparatus is used to advantage in handling corrosive materials and in carrying out difficult chemical reactions, especially when high temperatures or pressures are involved.

Platinum and palladium catalysts are also used in new production processes. "Platforming," a new refining method for producing gasoline with a high octane rating, is done with the aid of a platinum catalyst. A production plant using this new process is under construction.

The electrical industry continues to be an important consumer of platinum metals. Tiny contacts of platinum and palladium are used in great numbers in telephone equipment, thermostatic controls and household appliances and in a wide variety of industrial devices.

Rhodium, one of the six platinum metals, gained widely in popularity in the year just ended. A thin layer of rhodium electroplated on an article gives it a brilliant tarnish-proof finish that is harder than gold or silver.

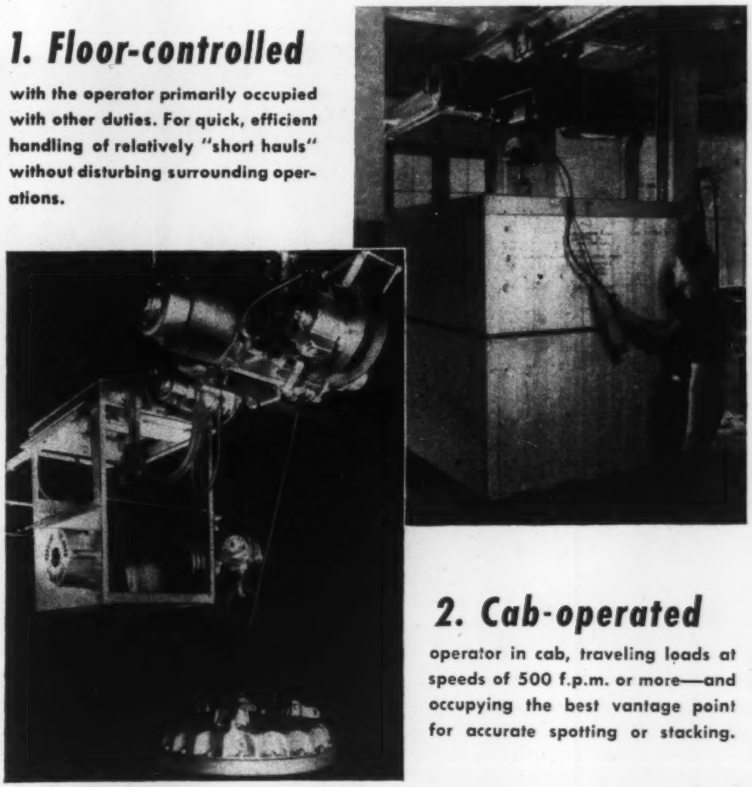
Canada continues to be the leading source of platinum metals which are also supplied by South Africa, Colombia and Alaska. Little is known about platinum metals production in Russia which was not an important supplier to world markets in 1949.

Better Second Half Century Seen

THE LAST half of the 20th century should be richer than the first from a business standpoint, says Gwi-

Bothered by a lifting or conveying bottleneck?

Reduce Handling Costs With the Right TYPE of Hoist



1. Floor-controlled

with the operator primarily occupied with other duties. For quick, efficient handling of relatively "short hauls" without disturbing surrounding operations.

2. Cab-operated

operator in cab, traveling loads at speeds of 500 f.p.m. or more—and occupying the best vantage point for accurate spotting or stacking.

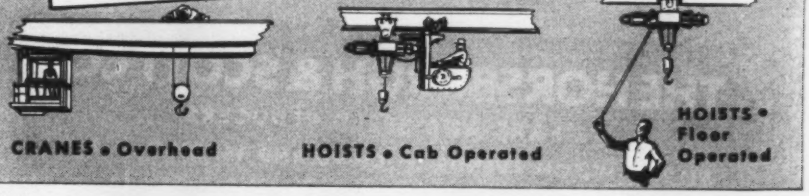
Floor-controlled? Cab-operated? Both are production boosters—but one is best for *your* job. We would like to work with you to determine the right type for your particular service.

We have given our complete attention to the manufacture of both types of hoists—and a complete line of overhead cranes—for a good many years. So we approach "through the air" handling with an open mind and a great deal of experience. May we show you pertinent data on installations similar to yours?

Shepard Niles

CRANE & HOIST CORPORATION

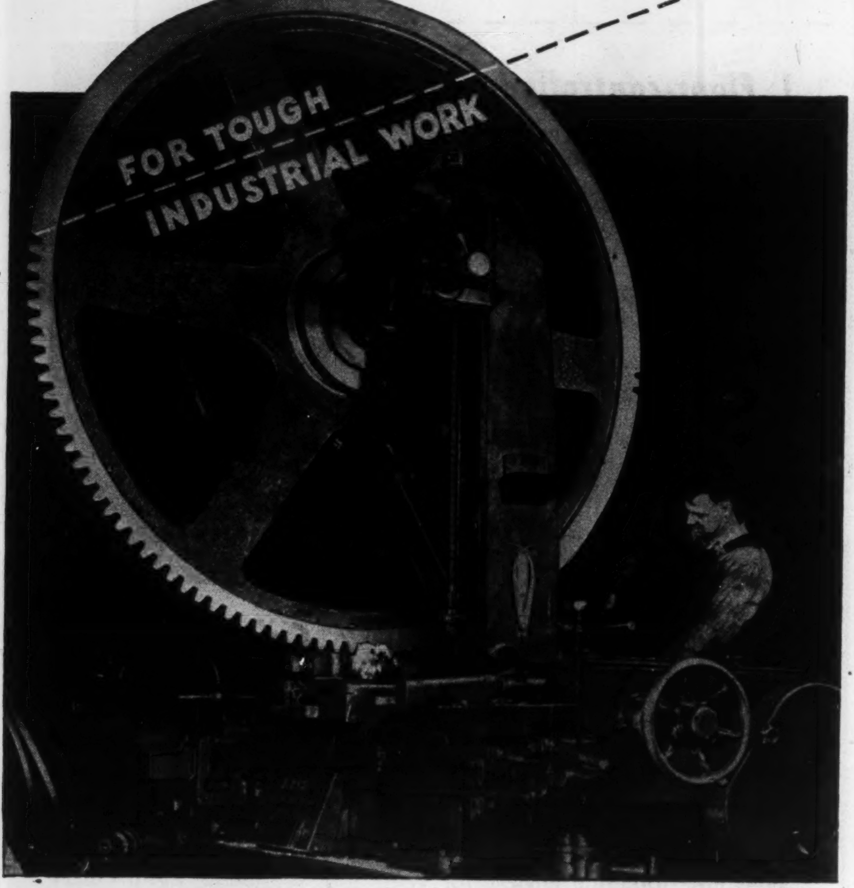
Makes and sells all three lifting tools for airborne shop loads



358 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

SPUR GEARS

by Horsburgh & Scott



● This large gear, in the making, will soon be doing hard work in a steel mill . . . just one of many gears made by Horsburgh & Scott in sizes up to 12 feet in diameter and 20,000 pounds weight. There's a Horsburgh & Scott gear for every job . . . accurate . . . rugged . . . built to endure . . . a trial will prove their quality.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 HAMILTON AVENUE • CLEVELAND 14, OHIO, U. S. A.

lym A. Price, president of Westinghouse Electric Corp. "We have a firmer foundation for our business structure now than at any time since 1941."

For the immediate future there are some encouraging signs, too. One of these is the smoothness with which our economy switched from a postwar boom to more normal conditions—still at a level greatly exceeding prewar.

While our population has increased about 15 per cent in the past ten years, the country still is doing well on a per capita basis, Mr. Price points out. Production of fuels, construction materials and consumers' durable goods is at least 50 per cent ahead of the 1935-1939 average. Semidurable goods output is ahead about 35 per cent, and capital goods production is nearly double the 1935-1939 average.

Despite encouraging signs, management must still solve these problems: Rising costs and an unfavorable attitude toward business in Washington.

Eastern Seaboard Steel Mill?

CARNEGIE-ILLINOIS Steel Corp. is acquiring a 3800-acre tract, 30 miles northeast of Philadelphia, "for possible future use as a site for an eastern seaboard steel mill."

Building of such a plant has not yet been authorized.

The 3800 acres are along the Delaware river in Falls Township, Pa. Purchase price and former owner were not disclosed.

United States Steel Corp., of which Carnegie-Illinois is the largest subsidiary, has no mill along the eastern seaboard. A mill on the Delaware would permit docking of ocean-going vessels bringing ore from a new U. S. Steel development in Venezuela. The ore there might be the key to the building of an eastern plant.

A tidewater steel plant also would improve U. S. Steel's competitive position in the East. It would reduce transportation costs to foreign markets and to domestic consumers near Gulf and East Coast ports.

Stacey-Dresser Moves

STACEY-DRESSER Engineering Division, Cleveland, is moving headquarters to Cincinnati.

E. A. Flaschar, general manager of Stacey-Dresser, will direct the co-ordination of the activities of his organization with those of its parent company, Stacey Bros. Gas Construction Co., a subsidiary of Dresser Industries.

Address of Stacey-Dresser Engineering Division becomes the same as that of Stacey Bros.: P. O. Box E (5535 Vine Street), Cincinnati 16.

Good Business in Copper

Revere chairman optimistic about industry's outlook for at least the first half

EXPECT copper to be in tight supply for some time because the government's accelerated stockpiling program is superimposed on a brisk industrial demand for copper products. That is the estimate of C. Donald Dallas, chairman of the board, Revere Copper & Brass Inc., New York.

Domestic producers in 1949, says Mr. Dallas, were unable to meet the needs of industry and government for copper in the U. S. Domestic production of the metal for the year is estimated at 896,000 tons. This includes newly mined copper plus scrap returned for processing. Deliveries of copper to fabricators in 1949 totaled about 1,148,000 tons; 170,000 tons were stockpiled. The domestic output was supplemented by imports.

Good Volume for First Half—Mr. Dallas says that "for the first six months of 1950 we can count on a continuation of the levels of the last quarter of 1949" in business activity. The last quarter was one of the best on record for the industry. Still going strong are these major copper consumers — construction, automobiles, utilities.

Copper will be going into the metalworking industry and government stockpiles at a rate of 110,000 tons a month for the first half. This will require imports of at least 30,000 tons a month to supply the demand. In 1948 the U. S. accounted for 60 per cent of world copper consumption, and for 43 per cent of world production. Corresponding figures for 1949 are 55 per cent of world consumption and 41 per cent of world production.

Per Capita Use Gains—In 1948, 18 pounds of copper per capita were consumed; 17.3 pounds in 1949. About 18 pounds per capita will be used in 1950, Mr. Dallas estimates. The average amount used from 1931 through 1940 was 10 pounds per capita.

He says that part of his optimism stems from the increased uses for copper. "Copper tube for plumbing and for radiant panel heating, as well as copper sheet for flashing and other building uses, is gaining in acceptance."

Last year the copper industry apparently went through its shakeout period when the metal's price fell from 23.5 cents per pound to 16 cents. The price now seems fairly stable at 18.5 cents.

that pot of gold is yours

WITH

MicroRold Stainless Steel Sheet and Strip

IF you want stainless steel having

★ More area per ton

or

★ Equivalent area weighing 3% to 8% less

or

★ Unusually high physical properties

or

★ Reduced polishing costs

AND

IF you are interested in savings in cost of $152.00 per 100 sheets of polished 18 gauge ——————

use this coupon today

WASHINGTON STEEL CORPORATION
120 WOODLAND AVENUE
WASHINGTON, PENNSYLVANIA

Please tell me more about

☐ MicroRold's savings in fabricating

☐ Savings in material costs

Name……………………………………

Company……………………………………

Address……………………………………

City…………………………… State……………

WASHINGTON STEEL CORPORATION
120 WOODLAND AVENUE
WASHINGTON, PENNSYLVANIA

Send Now for your 1950 Catalogs!

T-J for TOUGH JOBS

Looking for *labor-saving ideas?* Get the latest T-J Catalogs and study the facts about T-J Performance! You'll find scores of ways to *increase production* and *reduce costs* with T-J for Tough Jobs! Whether it's air cylinders . . . hydraulic cylinders . . . Rivitors . . . Clinchors . . . air controls . . . or cutters . . . T-J builds 'em *right*—engineered with the know-how of 33 years . . . precision-built for utmost *accuracy* and *dependability*. Write . . . The Tomkins-Johnson Co., Jackson, Mich.

T-J
TOMKINS-JOHNSON
RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

HYDRAULIC CYLINDERS
Send for catalog H-47

AIR CYLINDERS
Send for catalog 43

CLINCHORS
Send for catalog 847

AIR CONTROLS
Send for catalog 645

CUTTERS
Send for catalog 148

RIVITORS
Send for catalog 646 and 847

Distribution Is Big Problem

IMPROVEMENTS in distribution loom as a major problem for American industry in the new year and the next half century, says William L. Batt, president of SKF Industries Inc., Philadelphia. "The next 50 years may go down in history as the 'age of distribution,'" he says and adds that significant political and economic events may hinge on industry's finding better ways to sell and find new markets.

He points out that in the first half of this century we have learned how to develop full productive capacity and yet most of the basic requirements of the world's population have not been met.

Using the roller bearing industry as a gage, since it supplies components to virtually every type of industrial undertaking, Mr. Batt sees encouraging prospects for 1950. The gradual decline from postwar peaks which began late in 1948 and continued through the year just ended will still be felt in 1950, he believes. Present conditions in the ball and roller bearing industry provide a basis for estimating that national income in 1950 will come close to the 1949 total.

Canadian Fastener Firm Formed

NELSON Stud Welding Co. of Canada Ltd. has been formed with manufacturing facilities in Toronto. Parent organization is Nelson Stud Welding Division of Morton Gregory Corp., Lorain, O.

The Canadian firm will supply end welded fasteners to Rudel Machinery Co. Ltd. which will distribute them through its Montreal, Toronto, Windsor and Vancouver outlets. Richard C. Blankmeyer continues as co-ordinator of customer service activities of the Canadian Nelson and Rudel.

Lincoln Distributes $3,005,200

LINCOLN Electric Co., Cleveland, this year distributed 1026 incentive payment checks totaling $3,005,200 to all its workers.

The average incentive check amounted to $2929, which brought the total earnings of the average worker for the year to $6078. Checks ranged from $25,000 for top managerial and engineering talent to $200 for short time employment.

The Public Will Be 'Boss'

"EVERY DAY 140 million people will cast their votes in the market places of America for or against the products offered for sale. Those businesses that serve the public well will succeed." Those are the words of John S. Coleman, president of Burroughs Adding Machine Co.

"In 1950," he says, "for the first time since the war, competition will be fully able to serve the public again; in virtually every line of business the public will be 'boss.'"

Mr. Coleman, nevertheless, thinks the outlook for business in 1950 is encouraging. He sees it as a great selling year with a much greater responsibility placed upon the salesman.

Farm Equipment To Rise

Steel price advance to necessitate upward adjustment in implements, says Oliver president

HOW steel price increases will affect manufacturing costs is explained by Alva W. Phelps, president, Oliver Corp., Chicago. In a letter to dealers and distributors of the Oliver line of farm and industrial equipment he says the steel products purchased by his company will average 8 per cent higher, ranging from an increase of 3.8 per cent to 19.3 per cent, the lowest increase being for a type of steel used in plows which advanced from $79 to $82, and the highest increase being in a steel used in row crop harvesters which advanced from $88 a ton to $105.

Between these extremes, Mr. Phelps says, the increases are 4.22 per cent (from $71 to $74 a ton) on steel for axles, 6.75 per cent (from $74 to $79) for high-carbon steel in tractor plow beams, 9.44 per cent (from $90 to $98.50) for cold-rolled sheets in tractors and combines, 10.6 per cent (from $75 to $83) for the mild steel angles used in various machines, 11.6 per cent (from $69 to $77) for hot-rolled sheets, and 15.6 per cent (from $96 to $111) for the long ternes used in gasoline tanks.

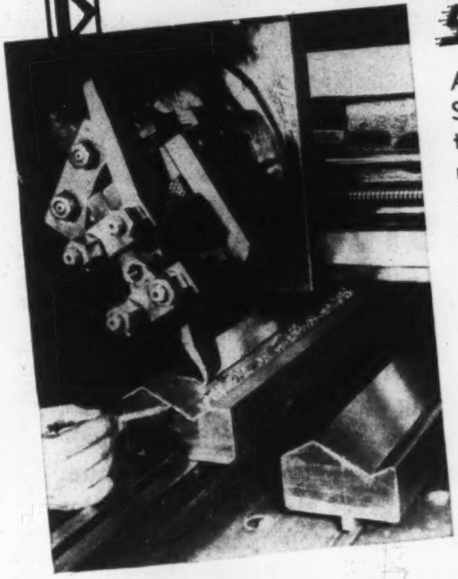
He points out that material and labor costs account for more than 85 per cent of the company's total expenditures and adds that the company is now negotiating a company-paid pension plan with the result that "Oliver's payments for labor will probably soon be increased, causing a further addition to its labor cost."

With these factors in mind, he says: "It is difficult to see how a general increase in the price of Oliver farm and industrial equipment can be avoided. We are appraising the effect of these cost increases, and I believe the results will dictate that a general price increase be made."

Cut machining time and tool costs-

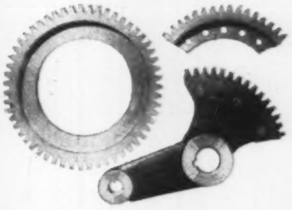
WITH THIS "IN BETWEEN" STEEL---

SPEED ALLOY



A hot rolled alloy plate steel, SPEED ALLOY meets the continually troublesome requirement for a readily machinable steel with physical properties higher than medium carbon steels and just under tool steels. Essentially oil hardening, SPEED ALLOY can be direct quenched or carburized to achieve high surface hardnesses. Mold and die makers and machinists are discovering its many economies. It's ideal for these press brake dies made by Dries & Krump Mfg. Co.. Chicago.

The chromium and molybdenum content of SPEED ALLOY qualify it for tough jobs like this sector gear made by United Precision Gear Co., Indianapolis, Ind. After trepanning the center and cutting the teeth into the outside diameter, the circle is cut into segments and heat treated. No distortion at all was experienced. Finished parts were fastened to the hitch feeding mechanism of a large punch press — Undoubtedly SPEED ALLOY can cut your costs and solve your tough jobs—plates stocked up to 72" wide and 6" thick flame cut to specifications and specially processed before shipment to insure maximum machinability—Send for bulletin #905.



These Speed Steels will save for you, too!

SPEED CASE X 1515

A low carbon, free machining, open hearth hot rolled steel plate. Desirable carburizing qualities. 70,000 p.s.i. tensile strength and other equally advantageous properties. Smooth finishes easily obtained. Widely used for molds, gears, sprockets, fixtures, plates.

SPEED TREAT X 1545

A medium carbon, open hearth, hot rolled steel plate — the fastest machining medium carbon steel plate. Sound, uniform hardening qualities. 90,000 p.s.i. tensile and other desired physical properties. Polishes to mirror-like finish. For molds, dies, machine ways, pressure plates, etc.

SINCE 1856

W. J. HOLLIDAY & CO.
(INC.)

SPEED STEEL PLATE DIV.
137th & Sheffield Ave., Hammond, Indiana
Plants: Hammond and Indianapolis, Indiana

DISTRIBUTED BY

Brown-Wales Co.
Boston - Hartford - Lewiston, Me.

Bridgeport Steel Co.
Bridgeport, Conn.

Beals, McCarthy & Rogers
Buffalo, N. Y.

Burger Iron Co.
Akron, Ohio

Grammer, Dempsey & Hudson, Inc.
Newark, N. J.

Earle M. Jorgensen Co.
Los Angeles-Houston-Oakland

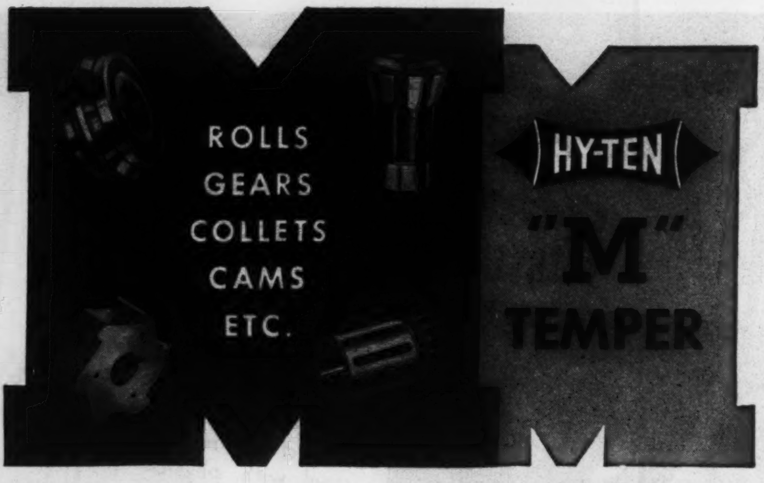
Passaic County Steel Service, Inc.
Paterson, N. J.

Peckover's Ltd.
Halifax - Montreal - Toronto - Winnipeg - Vancouver

Peninsular Steel Co.
Detroit, Mich.

Pidgeon-Thomas Iron Co.
Memphis, Tenn.

Horace T. Potts Co.
Philadelphia - Baltimore



OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE: ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS

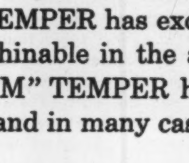
BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS.

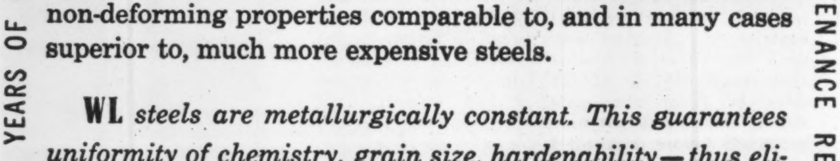
THE ALLOY STEEL THAT'S
MEANT FOR PUNISHMENT

"M" TEMPER oil hardening steel was developed specifically for such vital, punishment-taking parts as dies, cams, collets, forming rolls, clutches, gears, etc. "M" TEMPER effectively combines high hardness with maximum toughness, minimum distortion, extreme density and great strength—properties that ideally combine to resist wear and breakage. This grade develops the advantages of the powerful alloys—chromium, nickel and molybdenum. Moreover, "M" TEMPER has excellent forging properties and is readily machinable in the annealed condition. Although low in cost, "M" TEMPER has non-deforming properties comparable to, and in many cases superior to, much more expensive steels.

WL *steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hardenability—thus eliminating costly changes in heat treating specifications.*

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.





WHEELOCK,
LOVEJOY & CO., INC.
131 Sidney St., Cambridge 39, Mass.

Warehouse Service
CAMBRIDGE · CLEVELAND
CHICAGO · HILLSIDE, N.J.
DETROIT · BUFFALO
CINCINNATI

In Canada
SANDERSON-NEWBOULD, LTD., MONTREAL
AJAX DISTRIBUTING CO., LTD., TORONTO

HY-TEN
and AISI

Baltimore Foundry To Open Soon

FOUNDRY property in Baltimore acquired by Pittsburgh Mill Steel Co. Inc., New York, (STEEL, Dec. 5, p.80) from the General Services Administration is expected to be in operation early in January.

The plant occupies ten acres; its 21 buildings have a combined area of 190,000 sq ft. The main foundry building, containing 65,000 sq ft, is generally equipped to produce gray iron castings and soil pipe. One division is designed for magnesium castings.

New Jersey Firm Expands

PRECISION Drawn Steel Co., Camden, N. J., is awarding contracts for erection of a 10,000-sq ft plant addition. About 7600 sq ft will be provided for finished bar storage, the remainder for office facilities. Work is expected to be completed within three months.

Precision will install a 6-ton electric crane, 60-ft span, to be built by Maris Crane Co., Philadelphia. It is installing new conveying equipment, furnished by Standard Conveyor Co., St. Paul.

Buick Cuts Prices on Two Series

BUICK has reduced prices of its Roadmaster series $36 on the four-door sedan, $35 on the two-door sedan, $150 on the convertible, $270 on the steel-top convertible and $250 on the estate wagon.

The Super series was cut $45 on the convertible and $260 on the estate wagon. These reductions are exclusive of an earlier price cut of $40 on the Buick Dynaflow automatic transmission.

Inland Vessel Construction Up

CONSTRUCTION of tow boats, barges and other waterborne craft in 1949 by shipyards situated chiefly on the inland waterways, exceeds that of any other peacetime year in U. S. history.

"Most of these modern power unit pusher boats and the big barges they propel are built in a half dozen leading inland shipyards located at key points on the rivers and canals," says Chester C. Thompson, president of the American Waterway Operators, Washington. "The present day tow boat is something which would have taxed Mark Twain's imagination. It's not only a superdreadnaught of the rivers when it comes to power and performance (nearly every one is diesel-powered), but it furnishes quarters for its crew comparable to those aboard first class passenger boats. It also has every modern aid to navigation such as radar, ship-to-shore radio telephone, complex floodlighting system and other up-to-the-minute technical advancements."

The modern barge also is a long cry from the old fashioned flatboat. Barges are now built for special uses, such as carrying chemicals, steel, coal, oil, packaged goods, sugar, sulphur, automobiles and trucks, and many other commodities. Also on the decks of many oil barges are carried hundreds of new automobiles on the down river trips on the Mississippi river system.

In the first ten months of 1949 a total of 127 barges (non-self-propelled vessels other than sea going) were completed and delivered for service. These have a gross tonnage of 72,761 tons. Oil barges led the list with 47, hopper barges totalled 44, the others were acid, tank, cargo, spud and scow. An additional 25 tow boats and tugs were completed during the first ten months of this past year.

Manganese Found in North

LARGE VEIN of rich manganese ore was discovered in Ungava, the northern Labrador-Quebec area where rich iron ore bodies were found. Perhaps now the American steel industry will not have to depend on imported manganese as much as it has.

The fact was disclosed by George R. Reiss, Youngstown correspondent of STEEL. He visited the Labrador-Quebec area to see the new ore deposits.

"Labrador Mining & Exploration Co. has a diesel shovel tracing down the extent of the vein," says he. Dr. Joseph A. Retty, chief geologist of Labrador Mining, says he does not know how much manganese is in the vein but that it appears to be a large one. It will be a valuable by-product of the development of the iron ore deposits.

Five American steel companies are joining with the promoters to finance the development of a 360-mile railroad between Seven Islands, Que., and Burnt Creek, the main exploration base, to bring out the iron ore deposits. The companies are: Republic, National, Youngstown, Armco and Wheeling.

Steel companies have been piling up their blast furnace and open-hearth slag separately so manganese in the slag may be available in event of emergency. They have also been charging open-hearth slag back into the blast furnaces.

FOR STAINLESS AND LOW ALLOY WELDING HELP

Consult Your Arcos Distributor

- **QUICK SERVICE** - From ample local distributor stocks.
- **ELECTRODE SELECTION** - Experienced distributor help on proper selection from 56 different grades.
- **UNUSUAL PROBLEMS** - Distributor can call on Arcos Field Engineer.

ARCOS DISTRIBUTORS

NEW ENGLAND

Hartford 6, Conn.	Arcos Corporation
Boston, Mass.	Arcos Corporation

MIDDLE ATLANTIC

Buffalo, N. Y.	Root, Neal & Co.
Erie, Penna.	Boyd Welding Co.
New York, N. Y.	Arcos Corp., Phila., Pa.
New Jersey	Arcos Corp., Phila., Pa.
Philadelphia, Pa.	Arcos Corporation
Pittsburgh, Pa.	Williams & Co., Inc.
Rochester, N. Y.	Rochester Welding Supply Co.

MIDDLE WEST

Chicago, Ill.	Machinery & Welder Corp.
Cincinnati, Ohio	Williams & Co., Inc.
Cleveland, Ohio	Williams & Co., Inc.
Columbus, Ohio	Williams & Co., Inc.
Denver, Colo.	Western Oxygen Company, Inc.
Detroit, Mich.	C. E. Phillips & Company, Inc.
Fort Wayne, Indiana	Sutton-Garten Company
Indianapolis, Ind.	Sutton-Garten Company
Kansas City, Mo.	Hohenschild Welders Supply Co.
Milwaukee, Wis.	Machinery & Welder Corp.
Minneapolis, Minn.	Machinery & Welder Corp.
Moline, Ill.	Machinery & Welder Corp.
St. Louis, Mo.	Machinery & Welder Corp.
Salt Lake City, Utah	Whitmore Oxygen Co.
Toledo, Ohio	Williams & Company, Inc.

SOUTH and SOUTHWEST

Albuquerque, N. Mex.	Industrial Supply Co.
Atlanta, Ga.	J. M. Tull Metal & Supply Co., Inc.
Borger, Texas	Hart Industrial Supply Co.
Houston, Texas	Champion Industrial Sales Co.
Kingsport, Tenn.	Slip-Not Belting Corp.
Oklahoma City, Okla.	Hart Industrial Supply Co.
Pampa, Texas	Hart Industrial Supply Co.
Phoenix, Ariz.	Arizona Welding Equipment Co.
Tucson, Ariz.	Arizona Welding Equipment Co.
Tulsa, Oklahoma	Krisman Industrial Supply Co.

WEST COAST

Bakersfield, Calif.	Victor Equipment Company
Fresno, Calif.	Victor Equipment Company
Los Angeles, Calif.	Victor Equipment Company
Portland, Ore.	J. E. Haseltine & Company
San Diego, Calif.	Victor Equipment Company
San Francisco, Calif.	Victor Equipment Company
Seattle, Wash.	J. E. Haseltine & Company
Spokane, Wash.	J. E. Haseltine & Company

FOREIGN

Hilo, Hawaii	Hawaiian Gas Products, Ltd.
Honolulu, Hawaii	Hawaiian Gas Products, Ltd.
Toronto, Canada	Alloy Metal Sales, Ltd.

ARCOS CORPORATION

1500 South 50th Street, Philadelphia 43, Pa.

FIELD ENGINEERING OFFICES: Chicago, Ill., Los Angeles, Calif., Pittsburgh, Penna.

To Cut Production Costs . . .
"START WITH THE FINISH"

Unretouched photo reflects model measuring Wallingford Steel's new, wider 18-8 Bright Annealed Stainless. To 15" wide — to .070 gage.

WALLINGFORD 18-8
Bright Annealed
STAINLESS STRIP

Metal fabricators interested in cutting costs and improving their products will welcome Wallingford Steel's 18-8 Bright Annealed Stainless. The bright, mirror-like surface of this corrosion-resistant stainless makes it possible to "Start With The Finish". Costly, intermediate steps in rough and finish grinding are cut to a minimum — completely eliminated in some cases! And the long-lived brilliance of Wallingford's 18-8 Bright Annealed means added sales appeal for your products — attracts the eye, then says, *"buy"*.

FREE SAMPLE and data sheet on request.
Write: 112 Valley Street, Wallingford, Connecticut.

THE WALLINGFORD STEEL CO.

SINCE 1922

WALLINGFORD, CONNECTICUT, U.S.A.
LOW CARBON • HIGH CARBON
ALLOY • STAINLESS • STRIP and TUBING

Empire Steel Sold

Modern continuous strip mill may be installed at central Ohio plant

NEW OWNERS of the Empire Steel Co. plant at Mansfield are studying plans for installing a modern continuous strip mill to place the mid-Ohio facilities in a better competitive position.

The Empire plant was purchased from the Studebaker Corp., South Bend, Ind., by the Rema Co., organized by officials of Empire and Reeves Steel & Mfg. Co., Dover, for the purpose of buying the plant. The company will operate as the Empire Steel Corp.

Sale price of the Empire plant is reported to be near $5 million. Studebaker paid $7,430,000 for the plant in 1948 at the height of the steel shortage.

President of the new company is Don W. Frease, who has been president of Empire under Studebaker ownership. Vice president is S. J. Reeves, president of the Dover company.

Empire has six open hearths with annual ingot capacity of 369,730 tons. Hot-rolled sheet capacity is 120,000 tons.

Competition: 1950 Watchword

"COMPETITIVE" is the word Charles Lukens Huston Jr. would use if he were "to describe in one word business prospects for 1950."

"Competition in the steel industry," says the president of Lukens Steel Co., Coatesville, Pa., "already is infinitely keener than it's been for a decade. We of Lukens are optimistic, however, as we plan to expand our sales and sales promotional efforts in 1950.

"We anticipate that sales in 1950 will not be as good as they were in 1948 which was Lukens' last uninterrupted year of production, nor as good as they were in 1949 when sales volume was affected by the steel strike."

Since the end of the strike—for Lukens, on Nov. 5—the company has been operating its ten open-hearth furnaces at full capacity and its plate mills at near-capacity. The company does not expect to continue its present rate for more than the first six months of the year—if that long. The reason: pent-up demand is met and inventories are replaced. Lukens' outlook for the immediate future, however is good. The firm's postwar expansion program, costing $7.5 million, will help cut costs and lower the breakeven point.

Bessemer Developments

Highlight steelmaking advancements in 1949; other innovations to boost metal supplies

WHILE use of oxygen to speed steelmaking in the open hearth furnace continued to be a live research study, two new bessemer steel developments took the 1949 news spotlight on the technological stage of United States Steel Corp.'s operating subsidiaries.

At midyear measurable success with a new type of side-blown bessemer converter, called the "turbo-hearth," was announced by Carnegie-Illinois Steel Corp. in collaboration with Jones & Laughlin Steel Corp., Pittsburgh.

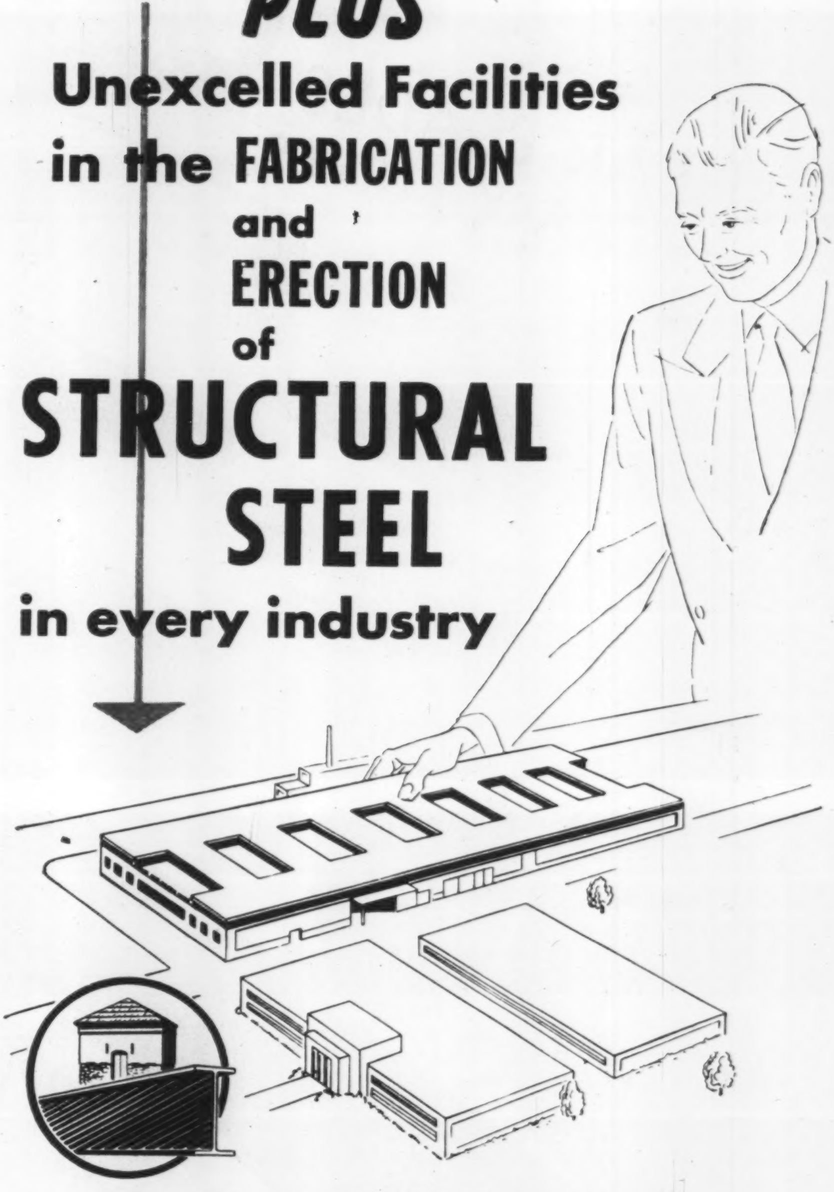
Continuous Tube Mill—A new continuous seamless tube mill, the world's first, was rolling at National Tube's Lorain Works. Geneva Steel Co. completed its conversion to the manufacture of hot-rolled coils to supply the new cold-reduction and tin plate mill of Columbia Steel Co. at Pittsburg, Calif.

American Steel & Wire Co. completed concentration of its stainless steel wire-drawing facilities at Waukegan, Ill. Carnegie-Illinois was operating new rolling facilities at its Gary, Ind., and Irvin, Pa., Works and new silicon sheet facilities at Vandergrift, Pa. A heavy-gage continuous galvanizing line was also in operation at Irvin works.

Late in the year, construction was begun on six new plants to process powdery iron ore to useable size and to recover iron from blast furnace flue dust. The plants will be built at strategic centers by Oliver Iron Mining Co., Carnegie-Illinois and National Tube Co. Completion of the new facilities will add millions of tons annually to the high-grade iron ore available for blast furnaces without requiring an equivalent increase in iron ore mining.

Turbo-Hearth — The turbo-hearth combines the advantages of the basic open hearth and acid bessemer processes. Steel is made in a partly closed vessel lined with basic refractories. As in all bessemer processes, heat is supplied by chemical action of blown air with carbon and other chemical elements in the charge, but in the turbo-hearth the air current is applied from the vessel's side onto the hot slag and iron of the liquid charge, rather than from the vessel's bottom through the entire charge.

The action is fast and direct, but subject to controls which reduce the nitrogen and phosphorus contents, making a steel comparable with open



Practical Experience
PLUS
Unexcelled Facilities
in the FABRICATION
and
ERECTION
of
STRUCTURAL
STEEL
in every industry

Steel plants, furniture plants, assembly plants, power plants, institutions, office buildings, bridges, wherever structural steel is used for new construction or additions to existing facilities—the Fort Pitt Bridge organization stands ready to assume the responsibility for fabrication and erection—backed by years of skill and experience and an outstanding reputation for dependability.

"Steel Permits Streamlining Construction with Safety, Endurance and Economy."

FORT PITT BRIDGE WORKS
Member American Institute of Steel Construction
General Offices, Pittsburgh, Pa. . . . Plant at Canonsburg, Pa.
BRANCH OFFICES
NEW YORK, N. Y. . . 441 Lexington Avenue
CLEVELAND, OHIO . . . . Bulkley Building
COLUMBUS, OHIO . Huntington Bank Bldg.
DETROIT, MICHIGAN . New Center Building

"MULTICUT" "TUFCUT" "HOT WORK"

Wapakoneta
SHEAR BLADES
and ROTARY KNIVES

Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.

℞ ENGINEERED TO THE JOB

Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.

The
WAPAKONETA MACHINE CO.
Shear Blade Specialists Since 1891
Wapakoneta, Ohio

hearth grades, suitable for more general use than customary bessemer steels.

Carnegie-Illinois recently announced that after a decade of painstaking experimentation and tests, it is prepared for commercial production of low-carbon (0.03 per cent maximum) stainless steels. These new steels, which are especially useful in industry, have resistance to intergranular corrosion equal to that of 18-8 stainless steels to which columbium and titanium stabilizers have been added. Welding tests demonstrated that the low-carbon stainless steels can replace the stabilized types for applications, such as welding, that involve short heating times in the sensitizing temperature range.

ZUPFTT!

TODAY engineers are photographing missiles moving many times faster than sound—even making pictures of sound waves themselves. Visible information provided by such photos is invaluable to those probing the behavior of fast aircraft, performance of machine tools or other high-speed industrial processes.

Photographing sound waves, which move about 760 miles per hour, requires a high-speed flash and a special optical system that can cast into sharp relief varying densities of air, according to William R. Plant of General Electric Co.

Method employed is known as Schlieren technique, and produces photographic images of sound waves, which are areas of high compression in air.

Drawability Predictor—Search for steels that will not dog-ear when formed into ketchup bottle tops led scientists of the corporation's research laboratory to a development which is also of keen interest to manufacturers of washing machine tubs, cooking pots and other symmetrical shapes. A new instrument designed at the laboratory and called the "recording torque magnetometer" can tell in a matter of 6 minutes whether or not a given type of steel can be drawn into deep shapes. The sample used is a flat disk, about the size of a 25-cent piece.

National Tube Co. announced that it had added two new banks of special creep-testing equipment and a full line of dynamic strain gage equipment to its research laboratory in Pittsburgh. At its National Works in McKeesport, Pa., a big new corrosion-fatigue testing machine was installed. On the unit, sections of seamless steel drill pipe are flooded with corrosive brine, simulating oil well conditions, and rotated for weeks under bending forces up to 200,000 inch-pounds. The machine measures the resistance of pipe to stresses that may cause fatigue failure during deep drilling.

Measures Strip Stiffness — Research scientists developed a strip temper mill extensometer to measure and control the stiffness of steel strip while it is being given its final rolling at speeds as high as 2000 feet per minute. This precision instrument measures final stiffness by comparing the speed of the strip as it enters the temper rolls with its greater speed as it emerges from them, the increased speed of delivery indicating added length, which indicates how much thinner the strip is rolled, the latter governing finished stiffness. This instrument does away with hand-operated gages, whose measurements cannot be calibrated quickly enough to serve operating uses efficiently.

The Geiger counter was adapted to the development of a quick and accurate method of analyzing steel samples. After careful calibration for many specific problems, some of which are yet to be solved, Geiger counter analysis is expected to be even faster than the direct-reading spectroscope, itself a recent development in metallurgical analysis.

New Power Source—Accurately reproducible results from spectrochemical analysis are obtained by the use of a new electric power source designed in American Steel & Wire Co.'s research department. Thoroughly tested and its results proved, it provides energy for either the spark or arc method of analysis. The unit is small and compact, serving as the base for the spectrograph. It is equipped with an air interrupter, to eliminate line voltage control and the high maintenance costs experienced with mechanical interrupters, and an oscillograph so mounted that the operator may observe excitation conditions at all times. The light source is designed for universal application in emission spectrochemical quantitative analysis.

Also in the field of spectroscopy, a new system was perfected for rapid sorting of various grades of stainless steels and detecting residual elements in them. The metal analyzer consists of a fixed-deviation glass prism spectrometer mounted on a portable cabinet. The visible range coincides with the visible range of the spectrum and may be increased by the use of photographic attach-

The ABC of MST

ALWAYS MAKES POSSIBLE
BETTER PRODUCTS
AT LOWER COST

Michigan
The Modern Electric Resistance
WELDED
STEEL TUBING

ECONOMICAL • LIGHT WEIGHT • MACHINE-ABILITY • HIGH STRENGTH • UNIFORM

ROUND
1/4" to 4" O. D. 9 to 22 gauge
SQUARE-RECTANGULAR
1/2" to 2" 20 gauge 1" to 2 3/4", 14, 16, 18 gauge

Can be Bent,
FLANGED, EXPANDED, TAPERED, DEPRESS BEADED, EXPAND BEADED, ROLLED, EXTERNAL UPSET, INTERNAL UPSET, SPUN CLOSED, FORGED, BEVEL FLANGED, FLATTENED, SWAGED, FLUTED.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

At MICHIGAN we've never admitted there are such words as, "It can't be done!" That's why we've convinced thousands of manufacturers that MICHIGAN TUBING is an ideal, cost-saving product component. No matter what you manufacture, let us prove that the use of MICHIGAN TUBING can give you a better product and save you money.

A Quality Product,
can be worked in your plant or prefabricated by MICHIGAN.

THE OLDEST NAME IN ELECTRIC RESISTANCE-WELDED STEEL TUBING

Michigan STEEL TUBE PRODUCTS CO.

33 Years in the Business
9450 BUFFALO STREET • DETROIT 12, MICHIGAN
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio

52 times a year your best

for complete metalworking information

ABC CCA

STEEL

THE PENTON PUBLISHING COMPANY • PENTON BUILDING • CLEVELAND 13, OHIO

customers look to STEEL

● Every week, the men you sell look first to STEEL for the information they need to improve production, lower costs, and increase their business. To more than 100,000 top metalworking men, these 52 issues are a "weekly information service" that add up to a complete record of the metalworking industry. They also provide manufacturers with the most economical way to tell their product story to Metalworking—to the key men in Management, Production, Engineering and Purchasing in the plants that do well over 90% of all metalworking business—to the men responsible for the production of over 60 billion dollars in metal products last year.

BLAZING THE HEAT TREAT TRAIL

One of four Holcroft rotary furnaces, used for carbo-nitriding, clean hardening and deep case carburizing. Includes quench and wash. Gas generator is built into furnace housing. Continuous automatic and batch-type operation are provided.

Typical parts after heat treating in Holcroft rotary furnace.

NEW *Holcroft* ROTARY FURNACE WITH BUILT-IN GAS GENERATOR

Offers Many Practical Advantages...

★ **HIGH PRODUCTION FLEXIBILITY**—Used for carbo-nitriding, clean hardening and deep case carburizing to 1700° F. Ideal for use where volume of work does not warrant a pusher- or conveyor-type furnace. Can be operated as an automatic continuous furnace, or as a batch-type unit with push-button control. Takes small and medium-size work in racks or bulk-loaded in trays. Loading area is 18 sq. ft.; maximum load, 1800 lbs.

★ **BUILT-IN GAS GENERATOR**—New Holcroft gas generator (patent applied for) is enclosed in furnace chamber, giving worth-while savings in cost and floor space. Supplies all diluent gas needed; requires no heat from furnace. Gas produced is unusually low in hydrogen (approximately 20%).

★ **GIVES UNIFORM CASE—MINIMUM WARPAGE**—Positive directed circulation of atmosphere gas by fan, plus 360° indexing of rotary hearth, assures uniform case even with bulk loading. Warpage is negligible, and stock comes out clean.

This new furnace is typical of the continuous developments which have maintained Holcroft leadership in furnace engineering for more than 30 years. This progressive leadership, implemented by *complete metallurgical and engineering service*, is your assurance of better work at lower cost in heat treat processing of every kind. We invite your inquiries.

SINCE 1916 *Holcroft* AND COMPANY

BUILT BY HOLCROFT & COMPANY DETROIT·MICH.

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

6545 EPWORTH BLVD. DETROIT 10, MICHIGAN

CHICAGO 3
C. H. MARTIN, A. A. ENGELHARDT
1017 PEOPLES GAS BLDG.

CANADA
WALKER METAL PRODUCTS, LTD.
WALKERVILLE, ONTARIO

HOUSTON 1
R. E. McARDLE
5724 NAVIGATION BLVD.

ments. The arc stand will accommodate a range of sample sizes and is contained in a housing with a safety switch on the door jamb to facilitate rapid changing of samples.

Tin Plate Meter—A new instrument in the tin plate field is a coating thickness meter. It may be set for coatings of various weights, three one hundred-thousandths of an inch being the usual thickness. If desired, the meter literally will sound an alarm the minute tin coating varies from uniform.

Three active and one spare 25-ton bessemer converters, all of unique, all-welded and stress-relieved design, are the core of the new steelmaking plant of National Tube Co. at Lorain, O. The new continuous tube mill is expected to manufacture up to 18,000 tons a month of seamless steel pipe and tubing in a diameter range from 2 to 4½ inches.

A new blooming, bar and billet mill was also added to the Lorain facilities during the year, to round out earlier inmprovements. These consisted of a giant warehouse to house a continuous supply of the company's Lorain products, a concentration of butt-weld pipe facilities, and new coal - handling and coke - making plants, including a coal research laboratory.

Much of the steel made in the converters will be deoxidized by a special fully killed process which makes it equal to open-hearth quality steel for tubing uses.

Gray Iron Progress Reviewed

FORWARD progress was again achieved by the gray iron foundry industry during the year just ended, reports Raymond L. Collier, executive vice president, Gray Iron Founders' Society Inc., Cleveland. With the advent of 1949 iron and steel scrap came into plentiful supply and became available at prices about half as high as in 1948.

Pig iron was under government allocation for housing end uses during the first few months of 1949 but following a conclusive presentation of the facts by the society, such allocation was dropped toward the end of April. This was many months before the law, according to the allocation power to government, was due to expire.

Modernization and mechanization of gray iron foundries proceeded throughout the year so that today the industry is better equipped and offers better working conditions than ever before.

The past year saw steady progress in the production of ductile (so-called nodular) irons and two patents covering this process, said to be basic, were granted to a company which pioneered the use of magnesium in this country to achieve nodulation of iron. While the total volume of commercial castings possessing the strikingly higher mechanical properties of this new product was relatively small, it was significant and it appears that the popularity and marketing of ductile irons will expand rapidly in the years just ahead.

Terms and conditions of sale of the industry were slightly modified at the suggestion of the National Association of Purchasing Agents, the revised code now being available through the society.

Gray iron foundries now have monthly statistics from the society to guide them, including information on number of employees, average hourly earnings, productivity, operations and number of lost-time injuries.

The smog question has become increasingly important to the industry, says Mr. Collier. Accordingly the society is conducting a nation-wide survey in order to gather all available information on this subject which will be passed on to the membership.

Gray iron tonnage shipments for the year just ended will again show about 78 per cent of all cast products, both ferrous and nonferrous, were gray iron, thus perpetuating the industry as the second largest in the metalworking field, next to rolled steel.

Gas Industry Outlook Good

GAS appliances and equipment sales in 1950 will exceed 1949 totals in every division of the industry and in some classifications will more than double prewar averages. This is the consensus of the 550 gas appliance and equipment manufacturers who are members of the Gas Appliance Manufacturers Association. Industry sales are expected to be close to 1947-48 alltime peaks.

To reach these goals manufacturers will intensify sales training, improve dealers sales aids and introduce more creative selling techniques among their dealers' outlets and salesmen. About half of the manufacturers polled by the association intend to increase sales forces by as much as 25 per cent.

Manufacturers expect: Gas range sales to be up 20 to 30 per cent; an even greater increase in incinerator, refrigerator and clothes dryer sales; gas-fired central heating equipment to be up 30 per cent; floor furnaces and direct heating equipment up 20 per

. . . even tempered for dies

FOLLANSBEE STRIP STEEL in coils is available in a range of tempers and finishes for all types of stamping and forming operations. Follansbee Cold Rolled Strip and Follansbee Polished Blue Strip can be fed right from the coil into high-speed machines for real productioneering in

making motorcars for millions

FOLLANSBEE STRIP STEEL has many potential uses in automobile parts fabrication where continuous feeding of automatics is so vital to cost-control. The machining qualities, and mill finish characteristics, of Follansbee Polished Blue Strip and Follansbee Cold Rolled Strip fit right into the pattern of precision manufacturing. Just call the Follansbee Steel Representative nearest you for full information.

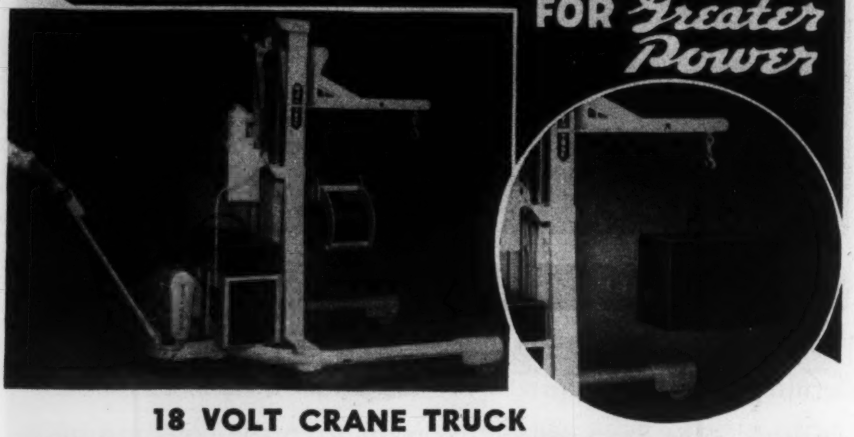
FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES, PITTSBURGH 30, PA.

COLD ROLLED STRIP • ELECTRICAL SHEETS • POLISHED BLUE SHEETS
SEAMLESS TERNE ROLL ROOFING

Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. Sales Agents—Chicago, Indianapolis, St. Louis, Kansas City, Nashville, Houston, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada.
Plants—Follansbee, W. Va., and Toronto, Ohio.
Follansbee Metal Warehouses—Pittsburgh, Pa., Rochester, N. Y., and Fairfield, Conn.

New types of MOTO-TRUCS
WITH 18 VOLT DRIVE UNIT AND BATTERIES--
FOR Greater Power



18 VOLT CRANE TRUCK
SAVES HOURS PER DAY IN REMOVING AND REPLACING LARGE ROLLING MILL BEARINGS AND PODS.

There are many other applications for a truck of this type—lifting loads out of pits, handling ladles, and many other hard-to-handle loads up to 4,000 pounds.

The control is simple, safe and dependable. You get two speeds forward and two speeds reverse by a turn of the wrist on easy grip roller type handle. Push buttons in the ends of handle operate hydraulic raising and lowering.

This truck can be furnished in various sizes and specifications. Tell us the nature of your work.

18 VOLT COUNTERBALANCE

This battery operated walkie type truck has the power for maximum efficiency in moving this type of truck with capacity loads, and ramp operation. Made with tilting and non-tilting, telescopic and non-telescopic mast. Forward and reverse movement is controlled by easy grip roller type handle.

Capacity: 2,000 to 2,500 pounds. Write for full details.

18 VOLT COUNTER-BALANCE TRUCK

MODEL	CAPACITY	FORK LIFT	COLLAPSED MAST HT.	TILT	TELESCOPIC	LOAD LENGTH	CHASSIS LENGTH	CHASSIS WIDTH
CB-120-25	2500#	120"	83"	Yes	Yes	36"	64"	36"
CB-120-20	2000#	120"	83"	Yes	Yes	48"	64"	36"
CB-94-25	2500#	94"	72"	Yes	Yes	48"	64"	36"
CB-63-25	2500#	63"	83"	Yes	NO	48"	64"	36"
→ CB-63-20	2000#	63"	83"	NO	NO	48"	64"	36"

18 VOLT PLATFORM TRUCK

This truck was built for a Large Cast Iron Pipe Mfg. Co. to handle loaded core rack in and out of ovens, where operating space was a factor. The former method of handling required three men to move this load. Now one man does the job with greater safety and no core breakage. COMPACT POWER UNIT: 25" from front of truck to back of battery. Platform is built to specifications for width and length of load. All controls in easy grip roller type handle.

Write for literature

The MOTO-TRUC Co.
1953 E. 59th Street
CLEVELAND 3, OHIO.
ORIGINATORS OF MOTORIZED HAND TRUCKS

cent; automatic water heater sales to be increased substantially.

Extension of natural gas pipelines, increases in gas manufacturing facilities and increasing acceptance of gas for home heating are the reasons for the industry's optimism. During 1949 gas furnace sales were 35 per cent above 1948, gas conversion burner sales were 500 per cent greater and gas heating boiler sales were up 30 per cent. Backlogs for gas-fired central heating equipment are now double those on Jan. 1, 1949. Unfilled orders for conversion burners are nearly 20 times greater than a year ago.

Manufacturers' shipments of gas ranges reached 2 million units 1949 and while 30 per cent under 1948 were 40 per cent above the 1936-1941 average. Sales showed steady increases from the January low with the fourth quarter exceeding 1948 levels.

The shipments in October reached an alltime industry high of 260,000 units. Other sales in 1948 were: Automatic gas water heaters, 1,350,000; warm air furnaces, 260,000; conversion burners, 290,000; gas boilers, 37,000; floor furnaces, 220,000.

"CENTERLESS BRUSHING": Problem of getting work in and out of a machine in shortest possible time—still obtaining high finish on rounded surfaces—was solved for a piston maker by above arrangement. Solution, according to Osborn Mfg. Co., Cleveland, simply consisted of substituting a rotary brush with 6-inch wire bristles for the grinding wheel on a centerless grinder. Technique serves both to remove grinding residue and blend sharpness of the work surfaces. It can be applied to finishing work having a cylindrical or circular periphery such as bearings. In this case, it even helps in assembling 3-inch diameter pistons with increased precision

Revival in Orders

For freight cars at yearend builds hopes for new buying in 1950. Backlogs melt in 1949

FREIGHT cars delivered to American railroads totaled 89,232 for the first 11 months of 1949. Car builders completed 61,005 and railroad shops added 28,227. Estimated deliveries in December bring the total to about 93,350, making 1949 the third highest year for deliveries since 1930, says S. M. Felton, president, American Railway Car Institute. Passenger car deliveries were up about 6 per cent over 1948, totaling an estimated 950 for 1949.

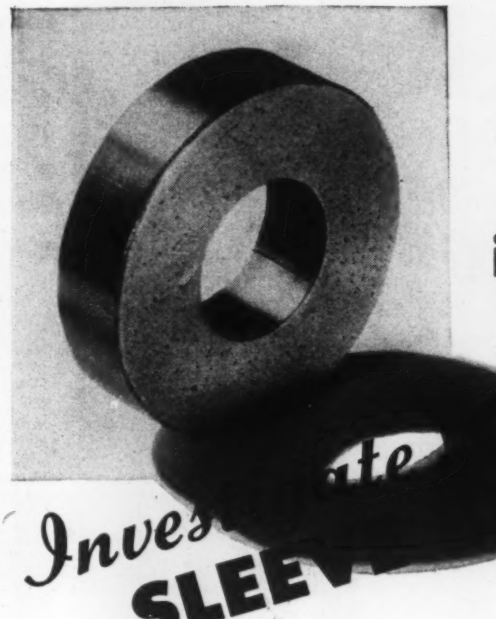
Backlog of unfilled orders for domestic freight cars on Dec. 1, 1949, the latest period for which figures are available, was 14,146. This compares with 103,896 at the beginning of the year and reflects relatively high rates of delivery during 1949 and a drying up of orders for cars during the year. During the first 11 months of the year, orders totaled only 5028 as compared with 89,426 for the same period in 1948.

Buying Revival—In the closing weeks of 1949, there were definite indications that the railroads would be in the market for new freight cars in substantial volume, probably in the early months of the new year. Some of the factors involved in predicting new orders in the period immediately ahead are: Requests from many railroads for bids on new cars, recent raising of the per diem rental of freight cars from $1.50 to $1.75, the age of many freight cars now in service, the fact that depleted backlogs will enable the car builders to give prompt delivery in 1950.

On Dec. 1, the backlog of domestic passenger cars on order was 1072, indicating substantially large-scale production through 1950, despite the fact that little new passenger car equipment has been ordered in recent months.

Standardization Brings Economies—A significant development during 1949 which should reflect itself in the cars ordered in 1950 relates to the standardization of various types of passenger cars, with resulting engineering and production economies. During 1949 a committee of the American Railway Car Institute, working in close co-operation with the railroads, proposed new and standardized floor plans covering all types of passenger train cars except sleeping cars and commuter cars.

Outlook for the car building industry must, of necessity, be related to that of the railroads, not only in 1950, but in the years ahead, Mr. Fel-



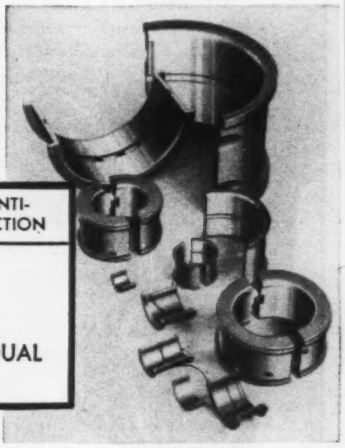
when
low cost
is
important

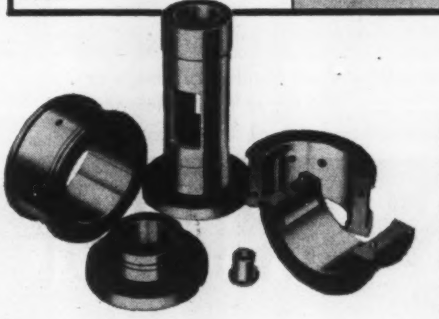
Inves ate
SLEEV HNSON
RINGS

YOU may be looking for a means of reducing the cost of parts and assembly time on equipment you manufacture. Here is an example of how Johnson Bronze can help. The sleeve bearing illustrated above was produced to replace an antifriction bearing in an important automotive application. It delivers equal or better performance yet costs *only one-third* as much. Multiply this saving by the thousands of units in which it is installed and you will quickly see the importance of the substitution.

check these
important facts

	JOHNSON SLEEVE TYPE	ANTI-FRICTION
Running Friction	LOWER	
Load Carrying Capacity	GREATER	
Resistance to Pounding	GREATER	
Precision	EQUAL	EQUAL
Cost	ONE-THIRD	





SLEEVE BEARINGS by Johnson Bronze are designed by engineers of long practical experience and years of metallurgical and mechanical research. Numerous leading manufacturers consult our specialists before designing or redesigning mechanical equipment. Such firms benefit by high bearing performance and low unit cost. You, too, are invited to write or to consult personally on bearing requirements with these Johnson Bronze Engineers.

Johnson Bronze
SLEEVE BEARING HEADQUARTERS
550 SOUTH MILL STREET • NEW CASTLE, PA.

COULD ANYTHING BE MORE CONVINCING THAN YOUR OWN EXPERIENCE?
HERC-ALLOY
STEEL CHAIN

Then give HERC-ALLOY the toughest chain job in your plant. Our asking for this test reflects the confidence given us by HERC-ALLOY service records from industry's leading plants.

HERC-ALLOY is America's ***first alloy*** steel chain. For slings or other applications HERC-ALLOY Chain will prove that efficiency, safety and economy can go hand-in-hand.

COLUMBUS McKINNON
CHAIN CORPORATION
(Affiliated with Chisholm-Moore Hoist Corporation)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: NEW YORK • CHICAGO • CLEVELAND • SAN FRANCISCO
Other Factories at Angola, New York, St. Catharines, Ontario and Johannesburg, S. A.

ton points out. In addition to constructive steps taken in 1949, such as long awaited rate increases and increased freight car rentals, revisions in transportation policy of a major nature are necessary if the railroads are to prosper.

Measures One in Ten Million

SUCH sulphur compounds as hydrogen sulphide, sulphur dioxide, mercaptans, thioethers and disulphides in concentrations as low as 0.1 part per million are measured by a new instrument for the continuous recording of such small trace quantities. Intended for use in a gas stream or atmosphere. The instrument, called the Titrilog and made by Consolidated Engineering Corp., Pasadena, Calif., is said to possess high sensitivity, versatility and fast response.

The chemical-electronic instrument operates on the principle of continuously titrating reactive compounds with electrolytically generated bromine to a potentiometric end-point. Rate of bromine generation is automatically controlled to equalize it to the rate of absorption of reactive gas, so that a very low end-point concentration of bromine is constantly maintained in the titration cell.

Automatic control of the bromine generation rate is accomplished through an inverse feed-back-type electronic amplifier. If reactive gas enters the cell and reduces the bromine, the voltage in the sensor electrodes in the titration cell will fall below the stable reference voltage, producing an input voltage to the amplifier which then automatically operates to increase bromine generation and satisfy the demands of the reaction.

A vacuum pump maintains a reduced pressure at the cell outlet, thus enabling the sampling of gases at pressures down to atmospheric. The sample gas enters the system at a preferred pressure of ½-psi and a portion is allowed to escape through a liquid pressure regulator in order to establish a constant pressure head on the remainder of the gas train. The gas passes through an orifice, is blended with air, and passes on into the titration cell. An orifice at the pump inlet regulates the rate of gas-air mixture.

Fluid absorbers in the instrument are said to permit selective recordings of compounds of specific interest. There are three filters in the standard model, and they may be set to operate automatically on any desired sequence.

Response to concentration changes is such that maximum titration levels are reached in 20 seconds. Because of this, it is said that the instrument is adaptable to automatic controls or alarm applications. Accuracy varies somewhat with the different compounds, but the calibration of the compounds of interest is within plus or minus 5 per cent.

Automatic Slender Turning

EXTREMELY slender shafts or tubing may be automatically turned to close tolerances by a precision lathe and screw machine attachment. Characteristics of the device include working tolerances to tenths of a thousandth, handling of work of great length and production of a groundlike finish.

Developed by Karge & Son Machine Co., of Brockport, N. Y., the Turnomat, as it is called, will be manufactured by Todd Co., of Rochester, N. Y., which recently acquired patent rights to the device. It is reported that various models are now in use by manufacturing concerns, model shops, tool and die makers and experimental shops in many sections of the country.

Turnomat may be used for turning plastics, fiber and rubber, as well as metals. It will fit many sizes or make of lathes or screw machines and in addition to turning, it will center to extreme accuracy, drill ream, tap, thread, thread chase and taper.

Tapers can be worked down to a needle point. In one typical use, it was reported that the work was 12 inches long and had seven diameters, with one end threaded. Device will be supplied in six different models to provide a wide range of sizes. Four are designed for turning and two models for taper turning.

A Veritable Gold Mine

GOLD—thousands of dollars worth—every day goes into sewers along with waste waters of the precious metals fabricating industry, according to Sam Tour of the consulting engineering firm of Sam Tour & Co. Inc., New York. In the manufacture of rolled gold plate, watch cases, spectacle frames, high grade jewelry, dental gold inlays and gold dentures, costume jewelry, emblems, and gold finished findings and novelties, there are many pickling, washing, polishing, tubbing, cleaning and electroplating operations, followed by washing operations. Considerable gold in solution and fine particles of the precious metal in suspension go down the drains with the waste waters and solutions from these operations.

Developed by this company, in co-

AS A
WELDMENT

TRAILER HITCH MANUFACTURER GAINS ALL 'ROUND IMPROVEMENT BY CHANGING TO UNITCASTINGS!

AS A UNITCASTING
- Cost Substantially Less!
- Machine Work Reduced!
- Appearance Improved!
- Accuracy Eliminates Mis-Fits!

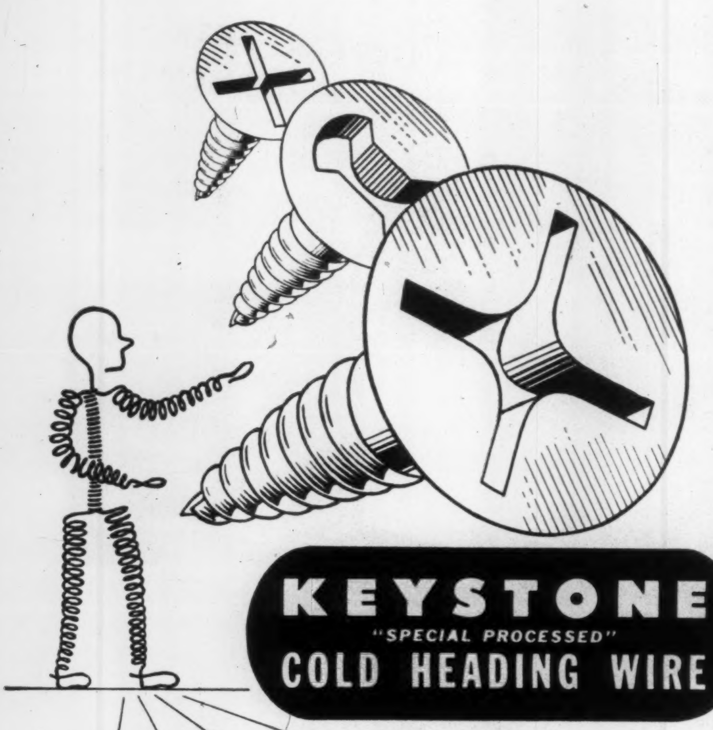
This product was really planned from all angles! After the mechanical success of the pilot model, using a weldment, the manufacturer figured production costs, sales appeal and qualifications such as durability. Although the weldment served its purpose for experiments, *it didn't answer any of the marketing problems!*

Unitcast engineers solved the difficulties. Toward a quality product, *Unitcastings* contributed a low *finished* cost; the trailer hitch had eye appeal; and all parts were accurate and durable. The job had been made right with steel castings . . *foundry engineered to fit the job!*

UNITCAST
QUALITY STEEL CASTINGS

Unitcast will welcome the opportunity to provide a "cast steel" answer for your parts problems, too. Our suggestions toward design, *while your product is still on paper,* may save you many dollars in time and future revisions! Write or call today! Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio. *In Canada:* Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

UNITCASTINGS ARE FOUNDRY ENGINEERED



KEYSTONE
"SPECIAL PROCESSED"
COLD HEADING WIRE

PROLONGS DIE LIFE
FEWER REJECTIONS
REDUCES INSPECTIONS

For recessed heads, Keystone's new special-process wire delivers the desired upsetting and die forming qualities with such a high degree of uniformity that finished product rejections are practically eliminated . . . individual inspection of screws is no longer necessary . . . die and plug life are often more than doubled. This new wire effects considerable savings in the production of Phillips head, clutch head and cross recessed head screws.

Keystone is prepared to help solve any of your industrial wire problems. If special treatment is called for, Keystone's metallurgical research and testing facilities are available to supply the answers. We welcome your inquiry.

KEYSTONE
STEEL & WIRE CO.
PEORIA . . . ILLINOIS

Special Analysis Wire, Setting New Standards of Performance

operation with Merrill Co. of San Francisco, is an adaption of the Merrill-Crowe precipitation process for treatment of waste waters in the plants of the precious metals fabricating industry. In this continuous automatic process, the waste waters are pretreated, clarified, deaerated and the gold precipitated and collected in a form ready to be melted direct.

A pilot plant for demonstration of the complete system and capable of handling about ½-ton of water per hour is being demonstrated by the Tour Co. It may also be installed in a prospective user's plant for a trial period. These installations are automatic in operation and said to require little attention. Gold in suspension and solution is recovered down to 10 cents per ton of the water going to the sewer.

Design Seminar Announced

ACCEPTANCE by industry of the first Product Design Seminar offered by Lehigh University last summer has led to the planning and announcement of a second seminar in 1950. It will again be conducted in co-operation with the Society of Industrial Designers on the university campus in Bethlehem, Pa., June 26 to July 21, 1950.

The four-week program will offer management personnel a concentrated review of problems of product design. Schedule of lecturers includes such well known industrial designers as: Raymond Loewy, Henry Dreyfuss, Walter Dorwin Teague and Harold Van Doren as well as specialists in color, consumer research, materials and fabrication techniques, psychology and motion study for design.

Speeds Construction

RISKS, costs and delays in the construction of buildings, roads and bridges are reduced by a new method of determining soil strength described by Lee Schlesinger, graduate assistant in civil engineering at Illinois Institute of Technology, Chicago.

Procedure, utilizing rotating blades, provides accurate in-place measurement and eliminates costly, time-consuming, unsatisfactory laboratory testing.

Four-faced blade is employed in making the tests. It is fixed to a shaft that turns at a constant rate in the soil. By relating the distribution of soil resistance on the surface of the blades to the measured surface force, is is possible to determine soil strength.

Modern Congress Needed

Need for strengthening representative branch of government noted by business engineer

CREATION of a joint standing committee to resume the work of modernizing Congress is recommended by Robert Heller, Cleveland business engineer and chairman of the National Committee for Strengthening Congress.

In a letter to all members of the House and Senate, Mr. Heller pointed out the need for a second-round effort to further strengthen the representative branch of government.

Mr. Heller, whose report, "Strengthening the Congress," issued in 1944, set the pattern for the reorganization of Congress under the LaFollette-Monroney Act of 1946, is chairman of the National Committee for Strengthening Congress, composed of national leaders in journalism, business, labor, and agriculture.

Five Main Changes—In his letter to the lawmakers, Heller, who directed the task force that studied the Post Office Department for the Hoover Commission and who is now engaged in reorganization work for the Department of Defense, pointed out five main changes that Congress should make. These are:

1. Creation of machinery for continuing organizational improvement.
2. Better control of expenditures.
3. Modernized procedure in the Senate.
4. Increased party responsibility.
5. Reduction of work load by transferring inconsequential details to courts and boards.

Mr. Heller pointed out that the new Congressional Reorganization Committee which he recommends should have authority to report its recommendations and proposed legislation directly to the House and Senate. It should not be prohibited, as the original LaFollette-Monroney Committee was, from recommending changes in the rules, practices, procedures, or customs of either the House or Senate. "The experience of the last three years indicates that the strengthening of Congress should be a continuous process, and that much remains to be done to increase its efficiency," Mr. Heller's letter continued.

Some Good Accomplished — While strongly criticizing the 81st Congress for failing to try to make the legislative budget work and for its other shortcomings in carrying out the existing provisions of the Reorganization Act of 1946, Mr. Heller found

HERE IS THE WAY

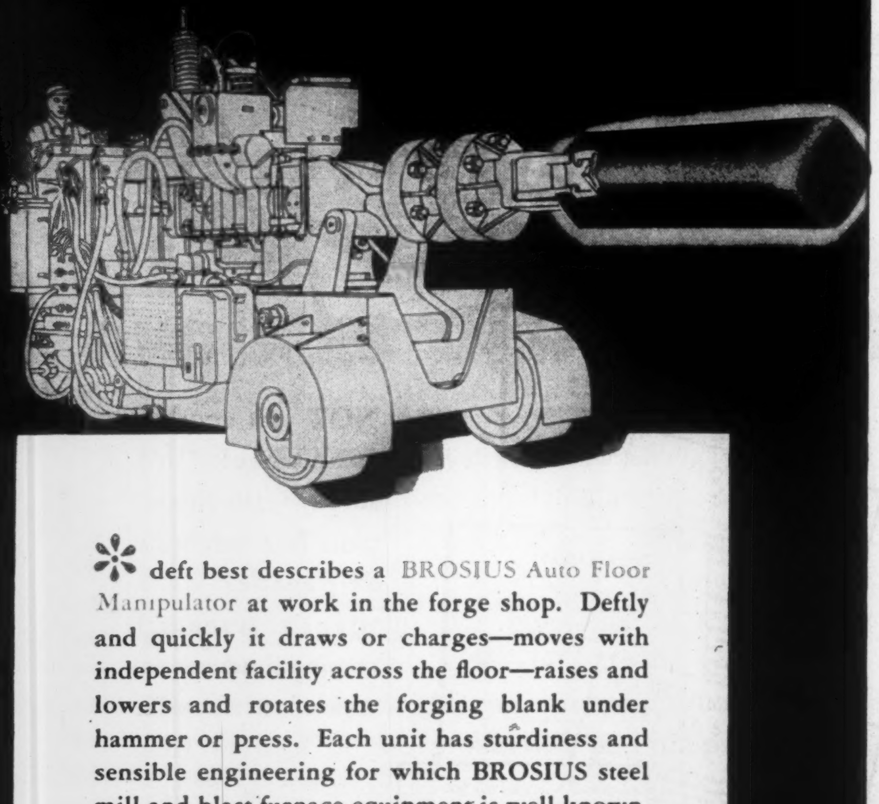
TO LOWER
MACHINING COSTS

COSTS
PROFITS
Stuart's
Wise Economy Plan
for cost reduction
SUGGESTIONS BY THE D. A. STUART OIL CO.
2727 S. TROY ST. CHICAGO 23, ILL.
survey
suggestion
service
why D. A. Stuart Oil Co. is qualified to serve
Wise Economy Results From Wise Selection of Metalworking Lubricants

NOT just another spot check "oil survey", the Stuart plan is a scientific appraisal of a plant's over-all cutting fluid needs. Ask for details.

D. A. Stuart Oil CO.
EST. 1865
LIMITED

2735-37 S. Troy St., Chicago 23, Illinois deft*



* deft best describes a BROSIUS Auto Floor Manipulator at work in the forge shop. Deftly and quickly it draws or charges—moves with independent facility across the floor—raises and lowers and rotates the forging blank under hammer or press. Each unit has sturdiness and sensible engineering for which BROSIUS steel mill and blast furnace equipment is well known. BROSIUS manipulators will bring to your forge shop added safety, added speed, added economy —you should be using them. Write to us.

Edgar E.
BROSIUS
Company Inc.
SHARPSBURG • PITTSBURGH 15, PA.

much to praise in the actions of Congress.

Strength and improvements listed were:

1. Maintenance and effective functioning of the streamlined committee structure.

2. Use of joint committees and joint action in supervisory functions and the joint hearings held by standing committees of each house.

3. Improvement of staffing and aids to Congress through expansion of the legislative reference service and bill drafting services.

4. Gradual increase in registrations under lobby law and efforts of Congress to strengthen this act further.

5. Breaking of the powerful House Rules Committee's "veto" power by the new "21-day rule."

6. Agreement in both houses to include all general appropriation bills in one consolidated bill beginning in 1950.

Failures of the 81st Congress outlined in Mr. Heller's letter included:

1. Failure of Congress to adopt a legislative budget on the ground that the procedure was unworkable. (It has never been given a reasonable trial.)

2. Unprecedented delay by the Senate in final passage of general appropriation bills, causing worst log jam in congressional history.

3. Continuation of heavy work load of extraneous matters including private claim bills, private immigration bills, and District of Columbia city government.

4. Continuation of antiquated, obsolete, and overlapping organization and methods of administering two sets of housekeeping services of the Congress.

5. Certain defects in committee procedure, including refusal of House Committee on Appropriations to hold open hearings.

6. Extension of legislative session 11 weeks beyond July 31 adjournment date set by Reorganization Act, due largely to three-week filibuster in the Senate last March, and large-scale time-consuming irrelevancy in Senate debate.

7. Retrogressive amendment of Senate cloture rule on March 17 which increases the possibility of unrestricted filibusters.

8. Other failures include increasing absenteeism in the Senate; partial breakdown of party government in the Senate; and turnover of about one-third of professional committee staffs in both Houses.

Budget Control Needed—Mr. Heller's letter urged that Congress seriously attempt to make the legislative budget work to provide for better over-all fiscal management.

He recommended that a joint budget committee of 20 members study treasury revenue estimates and the President's expenditure estimates. They would report by February 15 a concurrent resolution and recommend either an increase or a decrease in the total appropriations—or an increase or decrease in total revenues as required to balance the budget or provide a treasury surplus. In the event they could not balance the budget, they would be required to recommend an increase in the public

Policy Committees Needed — Mr. Heller's letter to Congress also urged the House adoption of majority and minority policy committees as proposed in his report in 1944. "There should be a focal point within Congress where the people could fix responsibility for Congress' actions and inactions," he wrote. "Expansion of party eccountability is the most practical method of bringing responsibility into focus."

His letter also urged Congress to delegate more of the petty and inconsequential details now requiring legislative action to courts, boards, or other administrative agencies.

Too Much Oratory—Long-winded and irrelevant debate in the Senate was censured as "... exasperating to the members themselves. The protracted delays of the past session were due largely to this."

"We believe that there is growing sentiment in the Senate in favor of amending its rules to require that debate be germane to the pending business," he wrote. "The House of Representatives has had a rule of relevancy since 1789. We urge the Senate to adopt such a rule at its next session."

Piston Life Increased

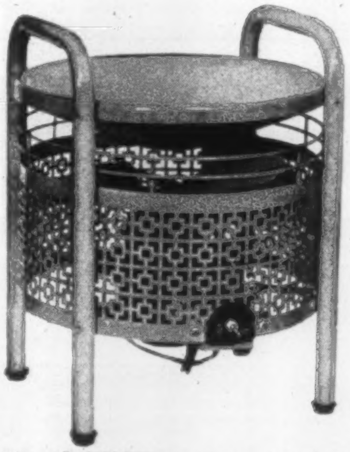
AN 18-8 stainless steel piston on an aqua ammonia pump had a life of only 180 days, but its replacement, hardened by the Super Scottsonizing method, has been in continuous operation for 1145 days and is still operating satisfactorily. This process, developed by C. U. Scott & Son, Inc., Rock Island, Ill., gives parts requiring tolerances up to 0.0002-inch, a case of 0.002 to 0.003-inch with a Rockwell reading of 68 to 70 C.

It is said that when stainless steel is processed in this manner it becomes hard enough to scratch a diamond and will cut ordinary glass. Although the case depth is light, it prevents galling and the metal retains most of its stainless qualities. It may be used with 302, 303, 304, 316, 410, 416, 420 and 440 stainless steel.

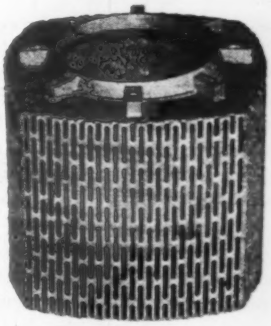
Wide range of applications for

Hendrick Perforated Metal

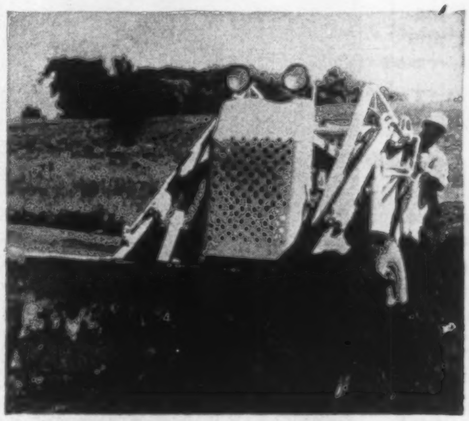
In the production of articles involving screening, ventilation, or the need of guards, perforated metal is finding a steadily widening use.



The ornamental guard on this Kisco fan is a typical example of the use of Hendrick Perforated Metal to combine attractiveness with utility.



For screening and straining applications, hundreds of combinations of shapes and sizes of perforations can be furnished in any commercially rolled metal.



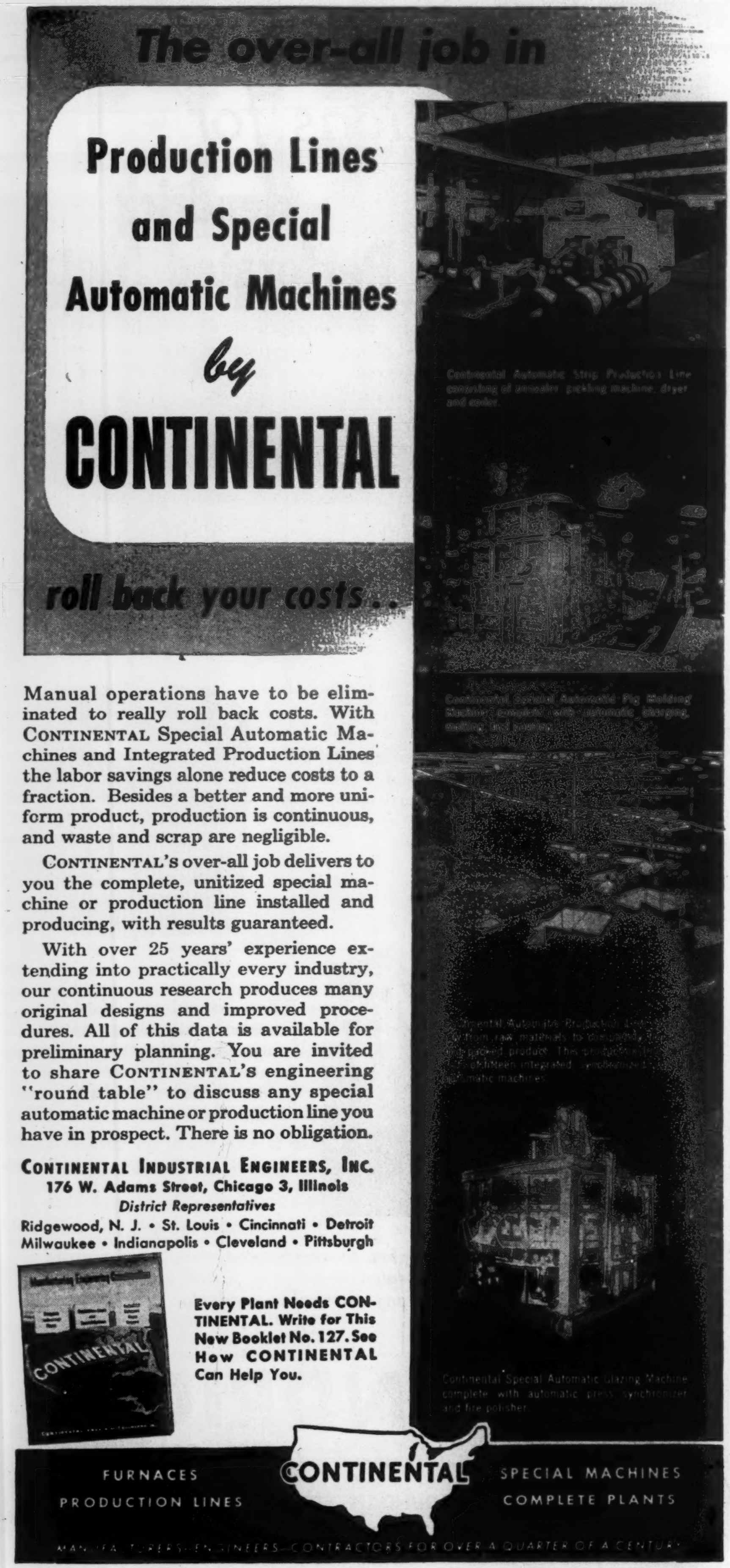
Where machinery must be protected without restricting ventilation, Hendrick Perforated Metal is ideal, as in its use for the radiator front of this Lull "Shoveloader."

We shall be glad to recommend the type of perforated metal best suited for use with any particular product.

SEE OUR CATALOG IN SWEET'S

HENDRICK
Manufacturing Company
30 DUNDAFF STREET, CARBONDALE, PENNA.
Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids


The over-all job in

Production Lines and Special Automatic Machines by CONTINENTAL

roll back your costs . . .

Continental Automatic Strip Production Line consisting of annealer, pickling machine, dryer and cooler.

Continental Special Automatic Pig Molding Machine complete with automatic charging, melting and pouring.

Continental Automatic Production Line [illegible] from raw materials to completely finished and packed product. This production line consists of fifteen integrated, synchronized [illegible] automatic machines.

Continental Special Automatic Glazing Machine complete with automatic press, synchronizer and fire polisher.

Manual operations have to be eliminated to really roll back costs. With CONTINENTAL Special Automatic Machines and Integrated Production Lines the labor savings alone reduce costs to a fraction. Besides a better and more uniform product, production is continuous, and waste and scrap are negligible.

CONTINENTAL'S over-all job delivers to you the complete, unitized special machine or production line installed and producing, with results guaranteed.

With over 25 years' experience extending into practically every industry, our continuous research produces many original designs and improved procedures. All of this data is available for preliminary planning. You are invited to share CONTINENTAL'S engineering "round table" to discuss any special automatic machine or production line you have in prospect. There is no obligation.

CONTINENTAL INDUSTRIAL ENGINEERS, INC.
176 W. Adams Street, Chicago 3, Illinois
District Representatives
Ridgewood, N. J. • St. Louis • Cincinnati • Detroit
Milwaukee • Indianapolis • Cleveland • Pittsburgh

Every Plant Needs CONTINENTAL. Write for This New Booklet No. 127. See How CONTINENTAL Can Help You.

FURNACES
PRODUCTION LINES
CONTINENTAL
SPECIAL MACHINES
COMPLETE PLANTS

MANUFACTURERS—ENGINEERS—CONTRACTORS FOR OVER A QUARTER OF A CENTURY

Still Trails Field

Safety and costs industry's two stumbling blocks in radioisotope research

INDUSTRY is still up in the air so far as radioisotopes are concerned.

Although rumors from private sources indicate a number of the larger organizations are carrying out radioisotope researches quietly, industry is still trailing the field in finding applications for isotope material.

Two principal stumbling blocks are responsible, according to Don M. McCutcheon of Ford's applied physics research center, Dearborn, Mich. These are:

Convincing management that apparent initial expense of setting up the necessary "hot" laboratory will pay off on results obtained; and illogical proportions assumed on the problem of safety.

What's It Going To Cost?—Industrial executives charged with keeping operation and research costs down, Mr. McCutcheon said, are not going to approve even moderate expenditures if proposals have nothing to recommend them. They are interested in both costs and returns. Engineers should be cautious in recommending the use of radioactive material as a substitute for other well established techniques. Most fruitful field of application of radioisotopes appears to be in their use as tracer elements in manufacturing processes. Little competition in this application will be encountered particularly since isotope methods offer a degree of sensitivity unattainable by other methods.

How Should It Be Used? — Big question in most industries, he stated, is deciding how radioisotopes can be used. Once a prospective application is decided upon, next question is—are outside experts needed or are facilities and personnel of the plant adequate? If the devision is to use plant personnel for the work, it is recommended that they be sent to Oak Ridge for a month's training.

A number of radioactive consulting services are available in principal industrial centers of the country. Unfortunately, these organizations are usually understaffed or overloaded with medical and biological projects. Another handicap, he pointed out, is apparent desire of these groups to staff their organizations with physics PhD's having little or no industrial experience.

According to Mr. McCutcheon, ideas for radioisotope applications in industry must come primarily from engineers in each plant. Consulting laboratories with little plant experience actually must depend upon published material to determine principal fields of interest to industry.

Regarding Safety—Very few local governments are active in establishing commissions or ordinances for regulating radiation hazards, he pointed out. If a purchaser of radioisotopes satisfies Oak Ridge that he is providing adequate safety facilities, it is up to him to monitor his operations during actual use. Rules governing tolerance limits for personnel subjected to radiation exposure are well established through the Bureau of Standards and the American Standards Association publications. Furthermore, the field advisory service from Oak Ridge generally sends representatives around to active laboratories as a check on the safety program of isotope users.

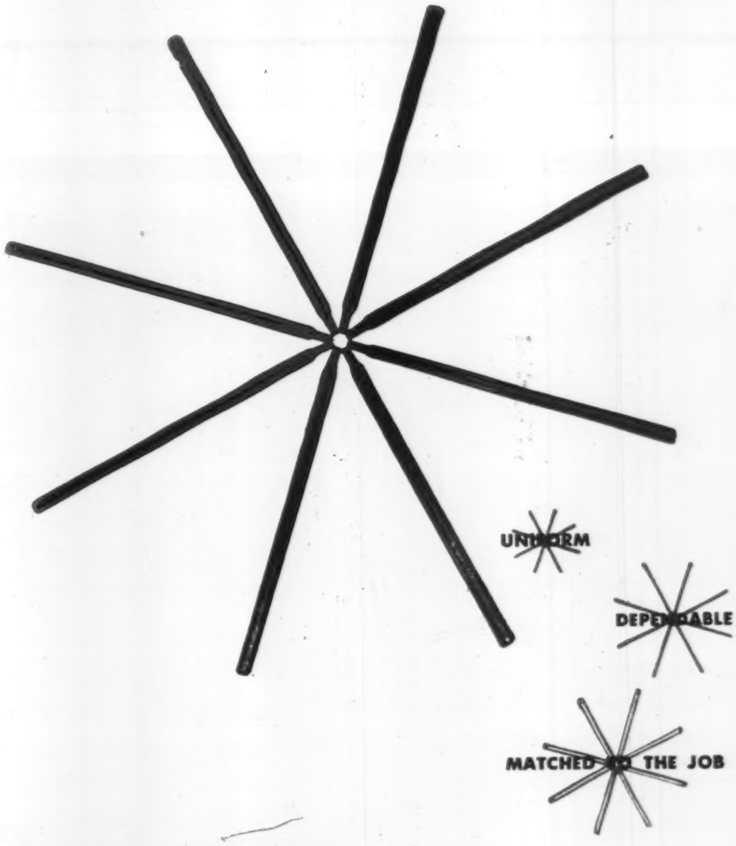
Absence of reports of serious exposures by any of the personnel in the many laboratories and institutions currently using radioisotopes indicates that the accepted safety rules are on the conservative side.

Uses Many Motors

OVER 300 motors, totaling more than 6000 hp, and ranging from fractions of a horsepower up to 500 hp, are to be part of the electrical system of each of the new American Export Express liners, the *Constitution* and the *Independence*. The ships, under construction by Shipbuilding Division of Bethlehem Steel Co., Quincy, Mass., will use the motors for such varied purposes as filling swimming pools, circulating ice water, compressing air for refrigeration, cargo conditioning and pumping bilge water.

About 250 motors on each ship will be supplied by General Electric Co., Schenectady, N. Y., for powering everything on board except bracket fans. The total of 6173 hp represents a cross-section of electric motor construction because of the wide variety involved, the company states.

Main current source will be four 1100-kw turbine-generator sets on each ship, operating off the main boilers. Direct current will be supplied to a few engine room and deck machinery motors through a pair of 200-kw motor-generator sets and two 30-kw motor-generator sets, all of GE manufacture. Four multispeed alternating current motors used to drive forced draft fans will be capable of operating at optimum efficiency at 200, 90, 50 or 22 hp. Two other multispeed motors for main condenser circulating drive pump operate at either 150 or 38



EIGHT WINNERS
FOR MILD STEEL WELDING

In the "Select 70"—seventy electrode types designed and selected by Metal & Thermit to cover every welding requirement at peak performance—eight rods matched to the various demands of mild steel welding permit easy choice of the *right* electrode for any mild steel job.

GENEX—for all-position work and bridging gaps.

TYPE FHP & TYPE F—for high speed, highest quality positioned work.

TYPE R—for sound weld metal on jobs involving vertical and overhead welding.

TYPE A—for general purpose welding with AC.

TYPE U—for structural welding with AC or DC.

ALTERNEX—for light gauge AC applications.

TYPE D—a new design for downhand welding and cover heads.

M & T products include M & T's "Select 70" group of electrodes. M & T AC and DC welding machines and M & T welding accessories. The line is complete, providing everything needed for arc welding . . . arc welding of top-notch quality. Write today for descriptive data.

METAL & THERMIT CORPORATION
120 Broadway • New York 5, N. Y.

ANOTHER BIG STRIDE FORWARD!

Announcing
2
NEW and amazingly superior steel abrasives

1 20th Century Drawn Steel Cleaning Shot

2 20th Century Drawn Steel Peening Shot

These new abrasives are made of hard drawn steel wire, by one of the older and most dependable manufacturers of metal abrasives.

EXTREMELY TOUGH AND DURABLE. They outlast conventional hard iron shot 8 to 1, and cast steel shot at least 2 to 1. Freight and handling costs are greatly reduced.

20th Century Drawn Steel Peening Shot makes a practical process of the shot peening operation because the pellet size and mass remain uniform many times longer than with other types of shot.

Why not SEE what these new abrasives will accomplish in your production? SEND A TRIAL ORDER TODAY.

•

A SIZE FOR EVERY NEED

THE CLEVELAND METAL ABRASIVE CO.

Main Office and Plant: 887 East 67th Street, Cleveland 8, Ohio
Howell Works—Howell, Michigan

hp. Of the motors being built in five different plants of the company, the largest will be two 500-hp motors for driving air compressors for the air conditioning systems.

Microscope Sees Internally

X-RAY microscope, which makes visible internal details of materials through which light cannot pass, is under development by General Electric scientists. Future refinements of the x-ray microscope, at present in the laboratory stage of development, may result in much sharper images and higher magnifications than are possible using visible light.

Clear, sharp x-ray images, magnified ten times, are produced in the laboratory, and these images magnified ten times further by photographic enlargement without serious loss of detail. Thus, at the present stage of development, magnifications of 100 diameters are produced.

Objects studied to date have been

WRAPPED IN LIQUID PLASTIC: Spare parts for assemblies usually are slushed with preservative, overwrapped — a time-consuming, costly procedure in protecting metals. Although reasonable protection is provided — if the covering is not punctured—parts still must be cleaned prior assembly. Such a situation is not true at Canadair Ltd., Montreal, Canada. Here company makes use of a liquid plastic, developed by Better Finishes & Coatings Inc., to protect aircraft components regardless of size and shape. Envelope-like "wrapping" not only keeps a check-rein on corrosion but also enables parts to be processed while covered. In the hot dimpling and riveting of fuselage sections (above) the liquid coating remains intact even though temperatures run up to 300° F.

fine mesh screens. Purpose of the studies is to test the instrument's ability to reveal small details.

The instrument operates on the principle that x-rays can be reflected from polished surfaces, as can visible light, provided they strike the surfaces at very small angles, almost parallel to the surfaces. It consists of an X-ray tube and a pair of curved mirrors, which the x-rays strike at an angle of less than one-half degree, after having passed through the sample. The mirrors, acting like a convex lens with a light beam, bend the rays in such a manner as to form a magnified x-ray image of the sample on a photographic film.

Mirrors are platinum-coated slabs of fused quartz, which are as nearly flat as surfaces can be made. They are curved by mechanical pressure, which can be adjusted by hand. This arrangement makes it possible to change the mirrors' curvatures in order to improve focusing.

Optical system, sample holder, and dials for making focusing adjustments are mounted in a compact metal unit half as large as a shoebox. The unit is placed a few inches away from the x-ray tube, with the x-ray beam passing through the sample in its holder, thence to the mirrors, and finally to a photographic film located a foot or more away from the unit.

Bars Radioactive Rays

CONCRETE is an effective protective barrier for gamma rays from cobalt 60, an artificial radioactive isotope.

According to an investigation conducted by National Bureau of Standards, Washington, the material is well adapted for use in storage vaults and other stationary installations where space limitations are not too severe, although lead and steel are more practical for shipping containers.

Cobalt 60, available from the Atomic Energy Commission for many scientific purposes, is superior to radium as a radiation standard for calibration of various measuring instruments.

Steel Castings Data Chart

VERSATILITY, strength and dependability of steel castings are shown in a technical chart of engineering data, distributed by Steel Founders' Society of America, Cleveland. Compiled in connection with the research and product development program of the society, the chart is intended to serve as a reference guide to economical steel casting production.

SENECA
THE SENECA WIRE & MFG. CO.

WIRE

SENECA
QUALITY
CONTROLLED

MANY SHAPES, MANY FINISHES
... *For Thousands of Uses!*

Quality control at Seneca allows you to plan production without future worries about material variations. Iron, steel, low carbon, high carbon, tempered or untempered, aluminum and bronze wire are all produced according to the same high standard.

● *Shapes*
Square—Keystone—Flat-Round—Half-Round—Special Shapes—Straightened and cut.

●● *Sizes*
Number 40 W & M Gauge (.007) and larger.

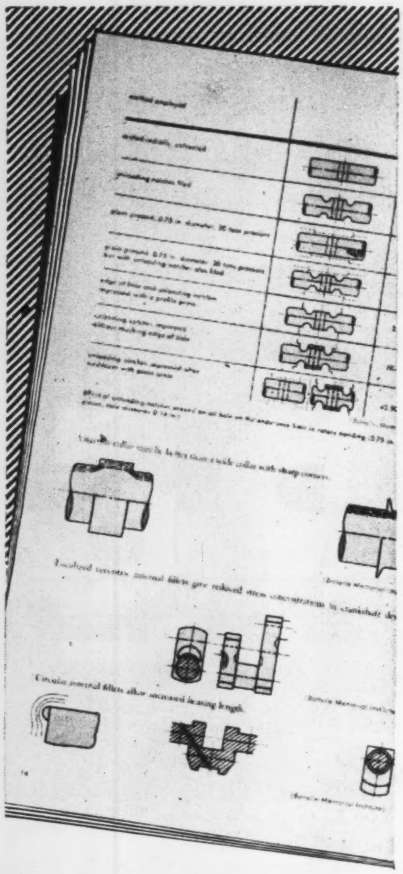
●●● *Finishes*
Liquor Finish—Bright Galvanized—Coppered—Enameled All Colors—Annealed—Tinned—Oil Tempered.

●●●● *Thousands of Uses*

Aircraft
Armor
Armature
Bee
Belt Hooks
Bobby Pins
Bonnets
Bookbinders
Bottlecap
Box Stitching
Brooms
Brushes
Button
Cable
Car Seal
Clips
Clock Spring
Cotter Pins
Curtain Springs
Drapery Pin
Fish Hook
Fish Tape
Florist
Fuse
Glass Netting
Grape Tying
Gutter Broom
Hair Pin
Hat
Hat Pin
Heddle
Hooks and Eyes
Link Fabrics
Lock Springs
Mattresses
Neeale
Picture Cord
Pins-Ropes
Pin Ticket
Piston Ring
Plow Steel
Reed
Regulator Spring
Ribbon
Safety Pin
Spark Coil Core
Special Springs
Spiral Binding
Stapling
Stitching
Umbrella
Valve Spring
Weaving
Wire Cloth

Save time and money by depending on Seneca Quality Controlled Wire to meet your specifications. Write today for quotation and delivery schedule.

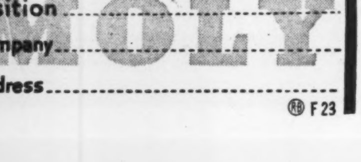
SENECA
WIRE & MANUFACTURING COMPANY
FOSTORIA, OHIO ESTABLISHED 1905
WIRE "SENECA"
REPRESENTATIVES AND WAREHOUSES IN ALL PRINCIPAL CITIES



The Design Engineer can improve service life

Ingenious design, based upon the understanding of imposed stresses and their proper control, can increase the life of machinery. A 72 page booklet, free upon request, discusses the relation between design, the choice of steel, and its treatment. Send for it.

Climax Molybdenum Company
500 Fifth Avenue · New York City



Please send your
FREE BOOKLET
3 KEYS TO SATISFACTION

Name..........
Position..........
Company..........
Address..........

MOLY

S-1
F 23

New Plating Tool

Mechanism of chromium plating studied successfully by employing radioactive tracer techniques

BETTER understanding of the mechanism of electrodeposition in chromium plating is the result of recent studies by the National Bureau of Standards using radioactive tracer techniques.

By tagging either the trivalent or the hexavalent chromium ion in a chromic acid plating bath with radioactive chromium 51, it was conclusively shown that metallic chromium is deposited out of the bath from the hexavalent state rather than from the trivalent state, as had previously been suggested. In addition to solving a long-standing problem in electrochemistry, the Bureau's work has demonstrated the utility of tracer methods as a tool for research on industrial plating processes.

For commercial chromium plating, the chromic acid bath, first reported is 1856, is at present practically the only chromium plating solution in use. This bath is prepared by dissolving chromic acid anhydride (CrO_3) and a little sulphuric acid in water. Initially, all of the chromium in the solution is in the hexavalent state; but when the plating current is applied, an excess of some trivalent chromium is formed by reduction of the hexavalent chromium at tne cathode.

This has led to numerous investigations into the mechanism of the electrodeposition process to determine whether the chromium is deposited directly from the hexavalent state or through the trivalent form. Several supporting arguments have been advanced by advocates of each theory of chromium deposition, but until now neither hypothesis had been conclusively proved. The National Bureau of Standards therefore undertook to determine experimentally the source of the electrodeposited chromium by use of radioactive tracers.

Five Baths Prepared—Five chromic acid plating baths were prepared, and a small quantity of radioactive trivalent chromium was added to two of the baths as chromic chloride ($CrCl_2$) while hexavalent chromium was added to the other three baths as radioactive chromic acid anhydride (CrO_3).

Chromium deposited from the first two baths was inactive. On the other hand, deposits from the baths in which the hexavalent chromium was tagged were found to be radioactive, and their activities were close to

"Oakite's new method for cleaning brass and copper before nickel and chrome plating is tops!"

From Connecticut to California, electroplaters are enthusiastic about the NEW Oakite brass-cleaning method that gives good protection against tarnish along with effective removal of oils and buffing compounds. Here are a few comments:

Wonderful cleaner for brass . . . Results have been excellent . . . Not a single reject on brass and copper work in two months . . . Good cleaning combination . . . All parts plate perfectly . . . Worth its weight in gold . . . No discernible tarnish during anodic cleaning . . . Rejects at lowest point ever . . . Nickel plate extremely adherent, very bright and lustrous . . . Getting excellent results in automatic plating machine . . . 15 to 20 seconds reverse did perfect job . . . Much brighter plating, much better adhesion . . . Could not detect any tarnish . . .

FREE Write today to Oakite Products, Inc. 32H Thames St., New York 6, N. Y., for full information.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

those of deposits from a bath containing active hexavalent chromium and no trivalent chromium. It was thus evident that the metal is deposited from the hexavalent rather than the trivalent state.

Solution of radioactive chromic chloride was prepared from small pellets of chromium metal containing a minute quantity of chromium 51. The pellets were weighed and dissolved in hydrochloric acid. Excess acid was removed by evaporating to dryness, and water was added to the residue.

Hydrogen Peroxide Added—Radioactive hexavalent chromium was prepared by adding hydrogen peroxide and sodium hydroxide or ammonium hydroxide to a portion of the solution of active trivalent chromium and heating the mixture on a steam bath. When all the chromium had been oxidized to chromate, the solution was evaporated to dryness to remove excess ammonium hydroxide and hydrogen peroxide. The residue was then dissolved in water.

Deposit from the plating bath was made on brass tubes 1 inch in diameter and 10 inches long. Each was supported vertically inside a cylindrical porous cell within a liter beaker. The anode was a cylindrical sheet of lead that fitted the inside wall of the beaker. The porous cell served to prevent anodic oxidation of trivalent chromium during the electrolysis. Chromium was deposited at a current density of about 30 amp per sq. dm. for intervals of 5 to 7 minutes, and the weight of the deposit was determined by weighing the cathode before and after plating.

Chromium 51 is a soft gamma ray emitter with a half-life of about 26 days. Its radioactivity in the solutions and the deposits was measured by means of a thin-walled glass gamma ray counter connected to a scaler. At the end of the plating process the Geiger counter was placed within the brass-cylinder cathode and the activity of the deposit was counted for 30 minutes. The tube was then rotated through 180 degrees, and counting was continued for another 30 minutes. A background count was also made with an unplated brass tube for the same period of 1 hour and was subtracted from the count for the plated tube.

Isotopic Exchange— Isotopic exchange frequently takes place between different valence states of the same metal. Had it occurred in the Bureau's investigation to any appreciable extent, it would have resulted in the presence of sizable quantities of both active trivalent and active hexavalent chromium in the plating bath, regardless of which was

ROLLS
- Angle Iron
- Bending, Iron & Steel, etc.
- Metal Forming
- Pipe
- Steel Mill
- Textile Printing
- Tubing

MACHINERY
- Cutting-off, Flying
- Cutting-off, Metal
- Cutting-off, Tubing (Welded and Lock Seam)
- Forming (Metal, Roll Forming Equipment)
- Forming, Cold Roll
- Shearing, Flying
- Shearing, Slitting Rotary
- Shearing, Sheet Metal
- Slitting, Metal
- Special
- Tube & Tubing (Welded & Lock Seam)

REELS
- Metal

WHAT Are YOUR Roll Forming Requirements?

● ***Write*** us, giving exact specifications covering your requirements. Estimates, proposals and descriptive literature furnished without obligation.

ARDCOR*
ROLL FORMING MACHINES

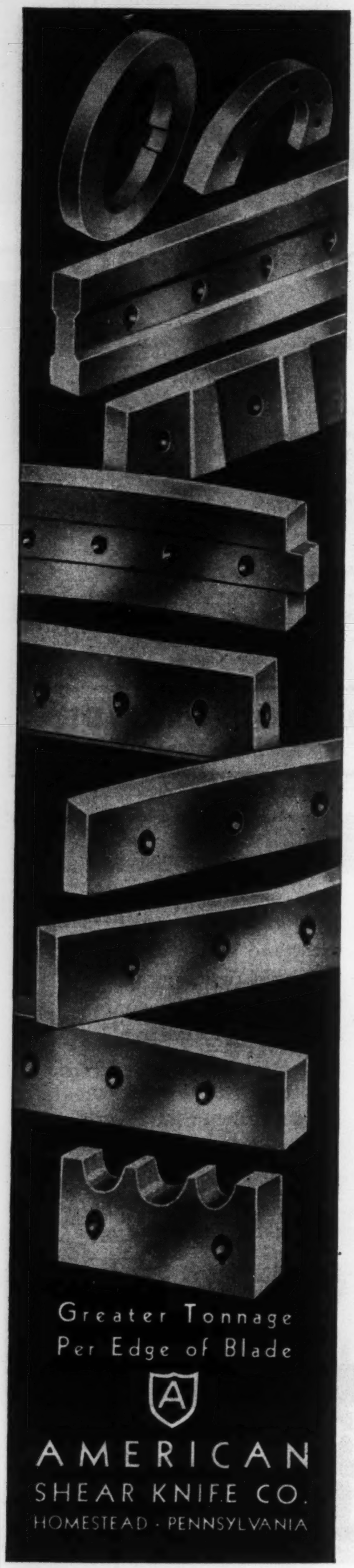
★ ARDCOR Craftsmen have the ability to serve, the experience to guide, and the facilities to produce your requirements to your complete satisfaction

***American* ROLLER DIE CORPORATION**
20700 St. Clair Avenue • Cleveland 17, Ohio

• Ruggedly made to withstand severe use .... advanced designing in fan blades .... rigidly mounted and securely locked in place .... well balanced and readily portable by overhead crane or auxiliary truck. Stationary and oscillating types with either pedestal (floor mounting) or bracket (wall mounting).

B. F. Perkins & Son, Inc.
HOLYOKE, MASSACHUSETTS
Manufacturers of Industrial Machinery Since 1873

PERKINS MAN COOLERS
TRADE MARK REGISTERED UNITED STATES PATENT OFFICE


Greater Tonnage
Per Edge of Blade

AMERICAN
SHEAR KNIFE CO.
HOMESTEAD · PENNSYLVANIA

added. This would have made it impossible to draw any valid conclusions from the experiment. It was therefore necessary, before performing the experiment, to determine the extent to which isotopic exchange takes place between trivalent chromium and chromic acid in the plating bath.

A stock solution containing both trivalent and hexavalent inactive chromium ions in fixed proportions was divided into two parts. To one part, active hexavalent chromium was added as chromic acid; to the other, active trivalent chromium was added as chromium chloride. These solutions were kept at 50°C for one hour, and at intervals 5-ml samples were taken from each solution. The hexavalent and trivalent chromium in each sample were separated chemically, and the activity of each fraction was measured. The activities of the two fractions of each sample showed that at the end of an hour a small portion of the tracer had undergone an isotopic exchange, but not enough to interfere with the investigation.

Research

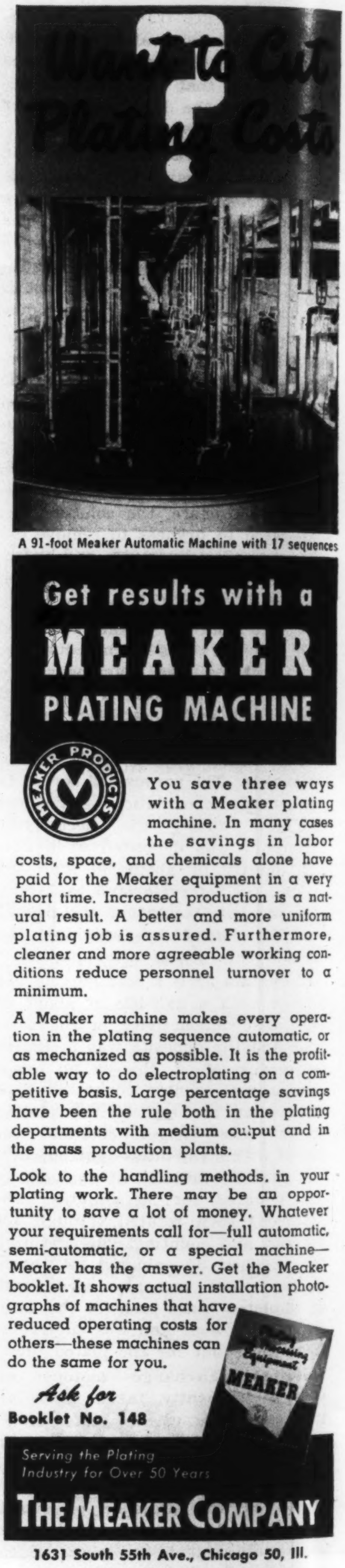
"THE WORK of research is like a cone resting on its apex. Each new discovery only opens up other things that cry for investigation. And as each is developed to commercial form it in turn poses its new problems for study. Thus, while research emphasis changes with time and in accordance with industry changes, we can count that research now in progress and to be done tomorrow will be productive of new technology, new industries and a better control by man over his enviornment." *Dr. J. A. Hutcheson, director, Research Laboratories, Westinghouse Electric Corp., Pittsburgh,* in the Mid-Century Review and Forecast Forum.

To Use Coating Process

LICENSE to use its patented process for continuous coating flat-rolled sheet and strip steel in a bath of molten zinc was granted to Inland Steel Co., by Armco Steel Corp., Middletown, O.

This continuous method of coating steel is radically different from standard galvanizing methods by which steel sheets are usually zinc coated.

Under the Armco process, cleaned



A 91-foot Meaker Automatic Machine with 17 sequences

Get results with a
MEAKER
PLATING MACHINE

You save three ways with a Meaker plating machine. In many cases the savings in labor costs, space, and chemicals alone have paid for the Meaker equipment in a very short time. Increased production is a natural result. A better and more uniform plating job is assured. Furthermore, cleaner and more agreeable working conditions reduce personnel turnover to a minimum.

A Meaker machine makes every operation in the plating sequence automatic, or as mechanized as possible. It is the profitable way to do electroplating on a competitive basis. Large percentage savings have been the rule both in the plating departments with medium output and in the mass production plants.

Look to the handling methods, in your plating work. There may be an opportunity to save a lot of money. Whatever your requirements call for—full automatic, semi-automatic, or a special machine—Meaker has the answer. Get the Meaker booklet. It shows actual installation photographs of machines that have reduced operating costs for others—these machines can do the same for you.

Ask for
Booklet No. 148

Serving the Plating Industry for Over 50 Years
THE MEAKER COMPANY
1631 South 55th Ave., Chicago 50, Ill.
Telephone CRawford 7-7202

steel strip enters a long furnace with controlled atmosphere consisting mostly of a mixture of hydrogen and nitrogen, with air essentially excluded. In the furnace the surface of the strip is made ready to receive the zinc coating and the steel is also annealed and softened.

Earlier this year Armco announced it would permit other companies to use the process under license arrangement.

Detects Minute Impurities

IMPURITIES in metals can be detected to one part in 10 million by a vacuum fusion apparatus being used at National Research Corp. of Cambridge, Mass. Designed as a tool for use in analyzing for minute impurities contained in highly purified metals, the equipment was assembled by the company's research division.

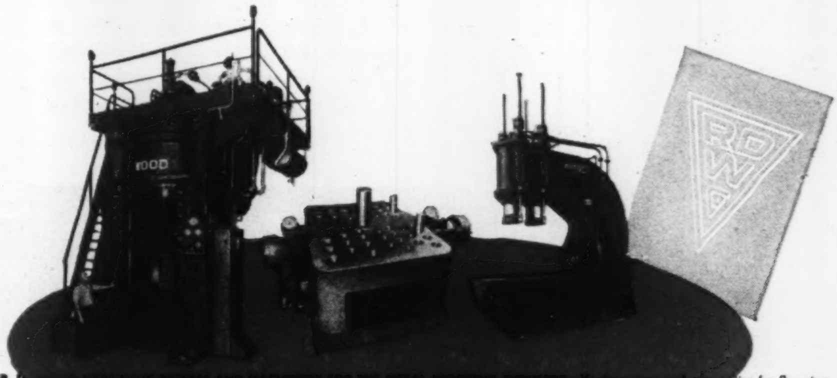
During various stages of preparation all metals retain or pick up small quantities of oxygen, hydrogen, nitrogen and carbon. While these elements may be contained as gaseous occlusions in structural faults, in solution or held in actual chemical combination as oxides, hydrides, nitrides or carbides of various composition and degrees of stability, it is known that even minute amounts may produce marked effects on the final metal property.

Drawing characteristics, ductility at both elevated and room temperatures, tendency toward strain embrittlement, and heat-treated properties as affected by the degree of effective utilization of reactive alloy additions has been found to be affected by gaseous impurities. With increased demand for special alloys containing reactive metals and for highly purified metals, and because analytical procedures for the determination of the elements in question were found to be impracticable in the percentage range encountered, vacuum fusion and vacuum combustion methods were developed to handle the problem.

Under high vacuum and under proper melting conditions metals may be made to give up their gases quantitatively. Combined oxides react with the graphite crucible in which the melting is conducted and the oxygen is released in the form of carbon monoxide. Hydrides and nitrides are decomposed and the hydrogen and nitrogen liberated directly. Choice of a correct temperature is important as it must be sufficiently high to decompose the chemical compounds and at the same time not so high that the metal being analyzed will volatilize and coat the inside of the apparatus. Occasionally, it is necessary to add a flux to assist in achieving these results. The mixture of hydrogen, nitrogen and carbon monoxide is pumped by a mercury diffusion pump into a vacuum chamber of known volume. The pressure of gas collected is measured by a McLeod gage which is intended to measure very low gas pressures.

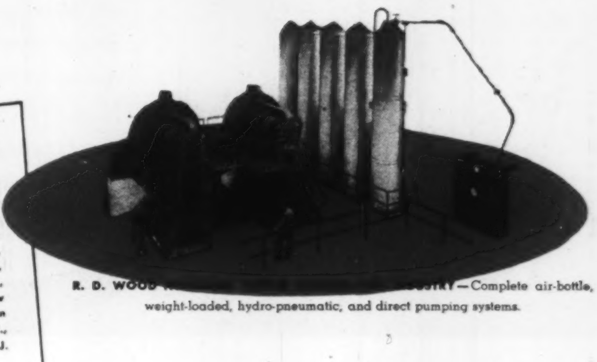
After the total pressure of the gases is determined, they are circulated through a tube containing copper oxide, where the hydrogen and carbon monoxide take oxygen from the copper oxide and are converted to water vapor and carbon dioxide, respectively. All gases circulate through a cold trap cooled to −196° C by liquid nitrogen. Here the carbon dioxide and water vapor are frozen out, while the nitrogen remains gaseous and is returned to the McLeod gage where its pressure is determined.

Cold trap is then warmed to about −80° C with a mixture of dry ice and acetone. At this temperature the CO_2 is freed and its pressure plus the pressure of the nitrogen is measured. Knowing the pressure of the nitrogen and that of the nitrogen plus carbon dioxide and the total pres-



R. D. WOOD HYDRAULIC PRESSES AND MACHINERY FOR THE METAL WORKING INDUSTRY—Various sizes and capacities for flanging, bending, straightening, joggling, forming, molding, forging, cupping, upsetting, and similar operations.

R. D. WOOD HYDRAULIC PRESSES AND MACHINERY FOR THE RUBBER, PLASTICS, AND PLYWOOD INDUSTRIES—Single and multiple-opening platen presses, laboratory presses, embossing presses and similar equipment in various sizes and capacities.



R. D. WOOD [illegible] INDUSTRY—Complete air-bottle, weight-loaded, hydro-pneumatic, and direct pumping systems.

Write to R. D. Wood Company, Philadelphia 5, Pa., for catalog sheets or other information concerning hydraulic presses and equipment. Or contact R. D. Wood representatives in the following cities: Akron, O., Birmingham, Ala., Buffalo, N. Y., Camden, N. J., Chicago, Ill., Detroit, Mich., Elmira, N. Y., Erie, Pa., Fort Wayne, Ind., Newark, N. J., Pittsburgh, Pa., New York, N. Y., Rochester, N. Y., San Francisco, Cal., Syracuse, N. Y., Toronto, Canada, Trenton, N. J.

HIGH PRESSURE HYDRAULIC [illegible] SIFIERS

R. D. Wood Company

EST. 1803

[illegible] BUILDING, PHILA. [illegible]

McDANEL
HIGH TEMPERATURE
COMBUSTION TUBES

Giving Outstanding Service in Metallurgical Laboratories FROM COAST TO COAST

OTHER McDANEL PRODUCTS

- Non-Spalling, non-blistering, gas tight Combustion Tubes.
- High Temperature Zirco Tubes.
- Self Cooling Combustion Tubes.
- Refractory Porcelain Specialties in stock or made to your specifications for your individual needs.

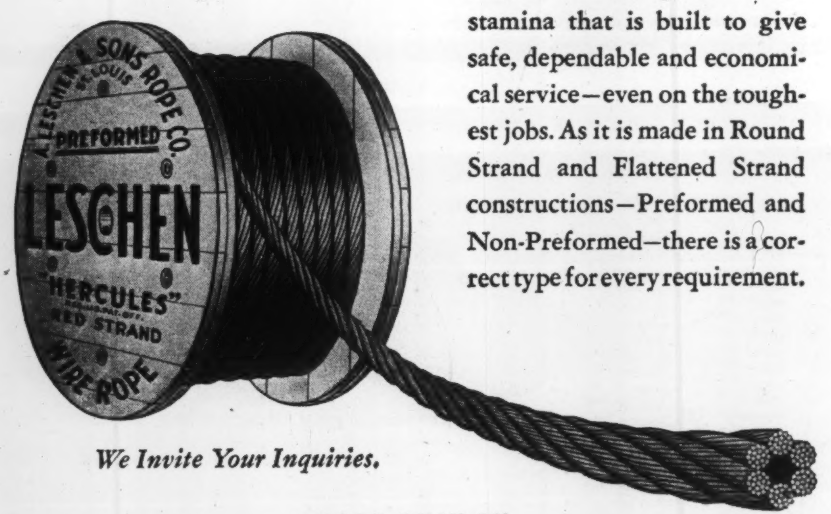
The acid test for any product is how it stands up in service. Here is what leading metallurgists in the iron and steel industries say about McDanel Porcelain Combustion Tubes and Zirco Tubes: "Highly satisfactory in every respect"—"Never spall or blister"—"We run 8 to 10,000 carbon and sulphur analyses a month with seldom a failure".

McDanel Refractory Porcelain Co.
Beaver Falls . . . Penna.

You Can Depend on

"HERCULES" (RED-STRAND) WIRE ROPE

Here is a Wire Rope with extra stamina that is built to give safe, dependable and economical service—even on the toughest jobs. As it is made in Round Strand and Flattened Strand constructions—Preformed and Non-Preformed—there is a correct type for every requirement.



We Invite Your Inquiries.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
ESTABLISHED 1857
5909 KENNERLY AVENUE • ST. LOUIS 12, MO., U. S. A.
NEW YORK 6 • CHICAGO 7 • HOUSTON 3 • DENVER 2 • LOS ANGELES 21
SAN FRANCISCO 7 • PORTLAND 9 • SEATTLE 4 • BIRMINGHAM 6

sure of the gases, it is possible to obtain the necessary data for computation of the weight of each gas present. As the volume in which gas was compressed is known, the number of molecules of each gas or the weight can be estimated.

Time for a single analysis, exclusive of the preparation of the sample, is about 1½ hours. It is said that accuracy depends largely on the individual system and the operator, but with care determinations may be made with high reproducibility.

Vacuum combustion system used to determine small amounts of carbon is similar in nature, but considerably simpler. Sample is heated in a ceramic crucible in the presence of oxygen under about 16 centimeters pressure. Carbon in the sample burns in the oxygen and is converted to carbon dioxide and mixed with the excess oxygen and passed through a freezing chamber where the carbon dioxide is frozen out.

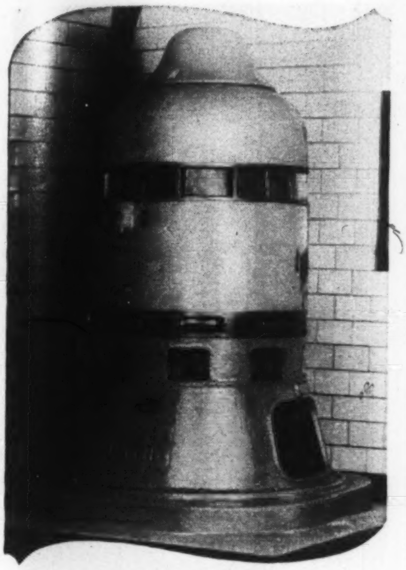
Gaseous oxygen then may be pumped from the system and the carbon dioxide allowed to warm up and its pressure measured by applying the same principles as outlined previously; the weight of carbon dioxide may be readily determined and hence the percentage. Analyses by this method have been said to give good results and checks are consistent to 0.001 per cent C.

Battery Has Silver Cell

WEIGHING one-third to one-fifth of conventional batteries is a silver cell battery, developed by Yardney International Corp., New York, through the co-ordinated efforts of its laboratories in England, France, United States, Sweden and other countries. In bulk, the volume of the Silvercel, as it is known, is only one-half to one-third that of other batteries. The ampere-hour efficiency approaches 100. Energy efficiency is 85 per cent.

In addition to the advantages gained in weight and space, the battery is said to show resistance to mechanical shock as there are no plates or separators to be damaged. Shock resistance is limited only by the strength of the case, which may be selected to meet any variety of requirements, the company reports.

Construction of the entire battery is claimed to eliminate the hazards of leakage and spilling. It is said to be able to withstand heavy discharges without any damage. Five types of batteries ranging from 0.5 to 40 ampere-hour capacity are available. Several other large capacity batteries are in the development stage in the company's laboratories.



What's the value of

HIGH PRECISION IN MANUFACTURE

Precision is a very important requirement by the Layne organization. It is the only feature that can adequately support skilful engineering and top quality materials. The results of high precision are,—smoother operation, greater quantities of water and lower upkeep cost.

All well water systems are complicated under ground construction projects that require much more than ordinary skill. Fortunately Layne has an abundance of real "know how" that came from years of world wide experience. When they plan a well water system, furnish the pumps and do the work complete, you get a thoroughly dependable job that provides years and years of fine service.

If your plans call for more water in 1950, why not call in Layne first, and obtain the value of their proved "know how" and the satisfaction of dealing with a firm of highest reputation. For catalogs bulletins etc., address LAYNE & BOWLER, INC., General Offices, Memphis 8, Tenn.

LAYNE

BUILDERS OF HIGH EFFICIENCY

WELL WATER SYSTEMS

ASSOCIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn., ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wisc. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corporation, Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F.
General Filter Company, Ames, Iowa

Aluminum Demand Climbs

1,200,000,000 pounds produced in 1949 despite labor problems and other limiting factors

ECONOMIC readjustments which affected practically all business and industry in 1949 were felt throughout the aluminum industry as well. Demand for aluminum and its products was at a high level throughout the first quarter of the year, but paralleled the general industrial pattern into a midsummer decline. This was followed by an encouraging uptrend beginning in the early fall months.

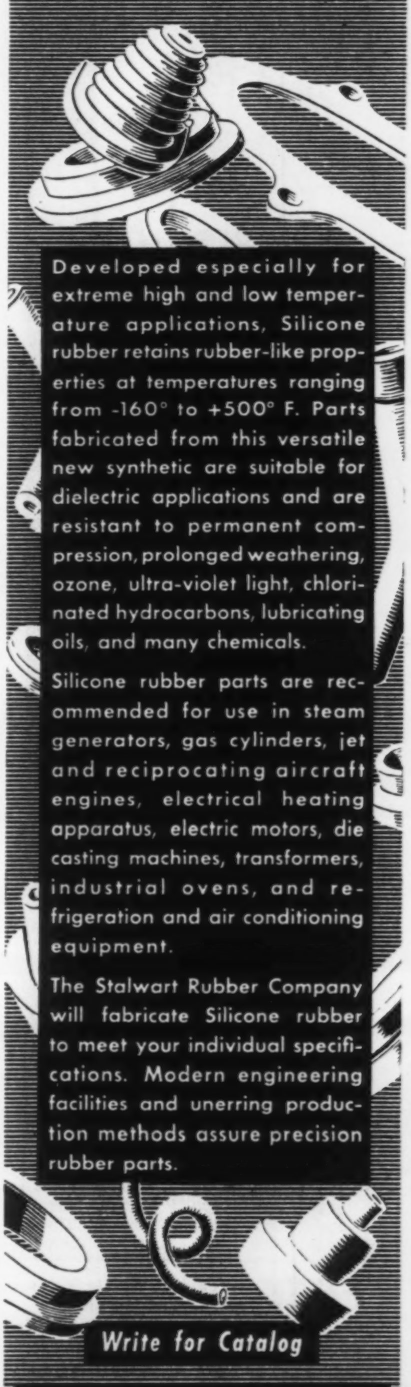
Labor problems then began to complicate the aluminum picture. Alcoa's aluminum shipments in the final quarter of 1949 were dealt a serious blow by the prolonged strike of the United Steelworkers, CIO, against nine plants of the company. This strike shut down approximately half of Alcoa's aluminum smelting capacity and several important fabricating units for nearly 2 months.

Despite the factors which tended to limit aluminum production in 1949, preliminary estimates indicate that the probable production of primary (new) aluminum by the whole U. S. industry will be slightly in excess of 1,200,000,000 pounds for the full year, as compared to approximately 1,247,000,000 pounds in 1948. The industry produced more primary aluminum in the month of May, 1949, than in any month since mid-war August, 1944.

Building Products Lead—Distribution of aluminum products by industries during 1949 was marked by a considerable rise in the proportion of the metal used in the field of transportation. Building products field had been the undisputed leader in the use of aluminum since the end of World War II, but during the past year transportation moved into a virtual tie for first place. The company's estimated shipments to various industries in 1949 were as follows:

Building products, 17 per cent; transportation (all forms), 17 per cent; cooking utensils, 7 per cent; power transmission (conductors), 8 per cent; household appliances, 7 per cent; machinery (general and electrical), 5 per cent; shipments to fabricators for further processing, 23 per cent; all other uses, 16 per cent.

Through most of 1948 demand for aluminum exceeded supply of metal available, but this situation was relieved in 1949, permitting the company to develop new products and



SILICONE RUBBER PARTS

Developed especially for extreme high and low temperature applications, Silicone rubber retains rubber-like properties at temperatures ranging from -160° to +500° F. Parts fabricated from this versatile new synthetic are suitable for dielectric applications and are resistant to permanent compression, prolonged weathering, ozone, ultra-violet light, chlorinated hydrocarbons, lubricating oils, and many chemicals.

Silicone rubber parts are recommended for use in steam generators, gas cylinders, jet and reciprocating aircraft engines, electrical heating apparatus, electric motors, die casting machines, transformers, industrial ovens, and refrigeration and air conditioning equipment.

The Stalwart Rubber Company will fabricate Silicone rubber to meet your individual specifications. Modern engineering facilities and unerring production methods assure precision rubber parts.

Write for Catalog

STALWART RUBBER COMPANY
5167 NORTHFIELD ROAD
BEDFORD, OHIO

Tempilstiks°

the amazing Crayons that tell temperatures

A simple method of controlling temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

Also available in pellet and liquid form

It's this simple: Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 each

gives up to 2000 readings

Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000
250				

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

GORDON SERVICE

CLAUD S. GORDON CO.

Specialists for 33 Years in the Heat Treating and Temperature Control Field

Dept. 14 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 14 • 2035 Hamilton Ave., Cleveland 14, Ohio

cultivate markets previously retarded because of metal shortages.

Among the new aluminum products introduced in 1949 were forged truck and trailer wheels, extruded floor systems for trucks and trailers, forged aircraft bearings, criss-cross tread plate, additional designs of pattern sheet, and a special grade of 3S alloy sheet for Alumilite-finish work.

New Casting Process—During 1949 Alcoa developed a plaster casting process which enables it to produce intricate aluminum castings having very accurate dimensions and super-smooth surfaces. Particularly suited to production of parts for automobile torque converters, the process has been installed at the Detroit Works, replacing the sand-casting facilities formerly located there.

With the completion of Alcoa's new rolling mill at Davenport, Iowa, aluminum sheet and plate are now furnished in width and length combinations greater than were previously available in the industry.

During 1949 a new and revolutionary type of aluminum curtain wall construction for office and institutional buildings was introduced. The company's completion of a thin-walled

TWIST, PULL AND POUR: Pouring of chemicals or solvents is accomplished without a drip when using 5-gallon pails equipped with a flexible plastic spout such as the one above, manufactured by Rieke Metal Products Corp., Auburn, Ind. Molded of translucent Bakelite polyethylene, it is easy to operate, involving only a twist of the wrist to remove the cap and pull of the spout to elongate it for pouring. As liquid about to be poured can be seen through the spout, spilling and waste can be minimized

when it comes to fasteners— can you afford anything but the best?

A *good* fastener costs very little more to buy than an ordinary fastener.

But—anything but the best fastener can add costs in terms of assembly time and high reject ratio.

That's why it pays, for very little more, to buy *good* fasteners.

Scovill Makes
***Good* Fasteners**

Recessed Head Screws • Sems
Tapping Screws • Standard
Machine Screws • Special Cold
Headed Parts

SCOVILL

SCOVILL FASTENERS

Industrial Fastener Sales, Waterville Division
Scovill Manufacturing Co., Waterville 14, Conn.

New York • Detroit • Wheaton, Ill.
Los Angeles • Cleveland • San Francisco

aluminum administration building at Davenport, Iowa, marked a radically new and economical departure from traditional office building design and erection. This type of construction has already been specified for several major buildings in other parts of the nation, and will be followed in the erection of Alcoa's proposed 30-story home office skyscraper, construction of which is scheduled to start in mid-1950 in downtown Pittsburgh.

Commercially significant developments were made during the year in electroplated, electrochemical, chemical and mechanical finishes for aluminum, advanced welding and soldering processes, production of wider aluminum foil and larger impact extrusions, flattening of tapered sheet for aircraft, and in casting and forging techniques.

More Facilities—An ultra-modern plant for the production of fluoride chemicals was completed during 1949 by the Aluminum Ore Co., a wholly-owned Alcoa subsidiary, at East St. Louis, Ill. Principal products of the plant are sodium fluoride, sodium bifluoride, and high-strength hydrofluoric acid.

A new wire, rod and electrical cable mill at Vancouver, Wash., was begun in 1949 to serve the growing Western markets for these products. Operations are scheduled to start at this mill in the early spring of 1950. Construction of a new Alcoa aluminum-producing plant at Point Comfort on the Gulf coast of Texas was largely completed in 1949, and metal production is expected to begin at this plant in early 1950.

Standardized Punches Cataloged

CAPABLE of continually punching metal up to twice the thickness of punch diameter, are Pivot punches, formerly produced only to specification but now available in a range of styles and sizes. The are noted in a catalog issued by Pivot Punch & Die Corp., 373 Old Niagara Falls Blvd., North Tonawanda, N. Y.

A whipsleeve, pressure cast and shrunk to the perforating diameter of the punch where it tapers into the shank, supports the fracture point of the punch. Additional punch strength is assured by straight grinding, so that the grain runs longitudinally with the punch from the perforating end to the critical point where perforating diameters start to taper. Grind lines are at right angles to any possible fracture. All punches are made of high speed steel and are installed in the same manner as any standard punch.

KRANE KAR
DOES 101 JOBS AT
WEIRTON STEEL

KRANE KAR *swings loads to either side*

KRANE KAR handles spare blooms for Blooming Mill, large slabs for Rolling Mill, charge boxes in Open Hearth, bars in Cold Drawn Bar Mill (finally loads them into railroad cars), changes rolls and bumper plates in Steel Strip Mill, and stands by to relieve heavy duty overhead cranes; transports all kinds of loads in Machine Shop, Construction and Maintenance Depts. With clamshell bucket, ***KRANE KAR*** moves sand in Welding and Foundry Depts., and coke in Coke Dept. *Ask for illustrated Bulletin 89—"How Metalworking Plants Reduce Materials Handling Costs."*

Gas or diesel, 12 to 37 ft. booms or adjustable telescopic booms; solid or pneumatic rubber tires. Buckets, magnets, and other accessories available.

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

1½, 2½, 5, AND 10 TON CAPACITIES

KRANE KAR

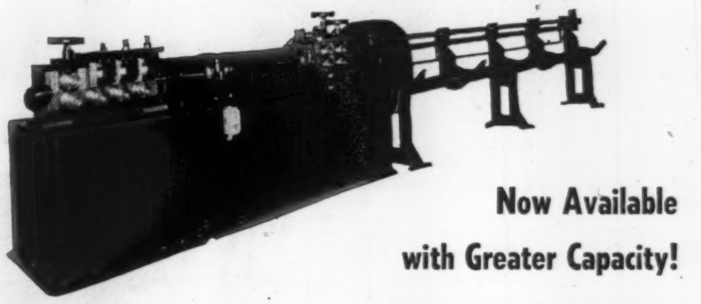
TRADE MARK REGISTERED

USERS: **Carnegie-Illinois, U.S. Steel, Bethlehem, Youngstown S & T, Basic Magnesium, Lima Locomotive, General Motors, Pullman Standard, etc.**

SILENT HOIST & CRANE CO., 849 63rd ST., B'KLYN 20, N.Y.

WIDEST RANGE STRAIGHTENERS BUILT

SHUSTER


Now Available with Greater Capacity!

Type 3A now straightens wire from ¼" to ½" dia., 9/16" in basic wire. Type 4A (similar to illustration) handles diameters from ⅜" to ⅝", 11/16" in basic wire. Other advantages are:

- Almost continuous wire travel
- Lightning cut-off assures square-cut ends
- High speed, direct driven 5-die straightening flier
- Quiet, highly efficient V-belt motor drive
- Ball and roller bearings throughout

Write for catalog

METTLER MACHINE TOOL, INC.

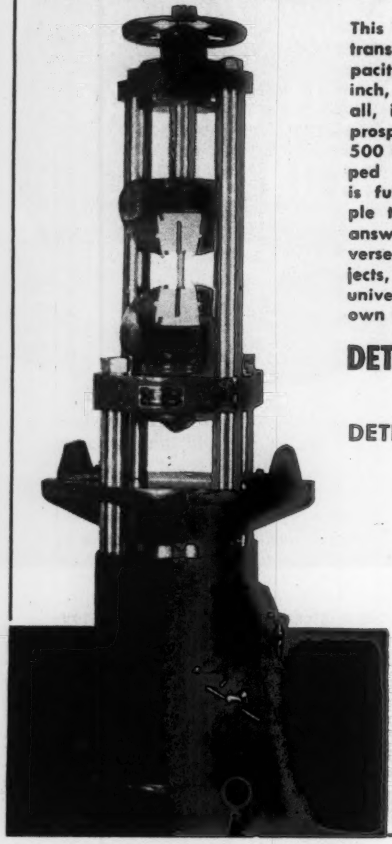
132R Lawrence Street New Haven, Conn.

Representatives in all principal cities and in foreign countries.

UNIVERSAL TESTING MACHINE

This is a very practical machine for tensile, transverse and compression testing. Its capacity, equivalent to 150,000 lbs. per square inch, on a standard .505 specimen. Best of all, it is priced within reach of the average prospective user. It weighs approximately 500 lbs., stands 4 feet 4 inches, comes equipped with gauges, grips, blocks and motor, is fully automatic, and is exceptionally simple to operate. If you want quick, accurate answers to questions concerning tensile, transverse and compression qualities of metal objects, just invest in this compact, practical universal testing machine. It will pay its own way in the saving of laboratory fees.

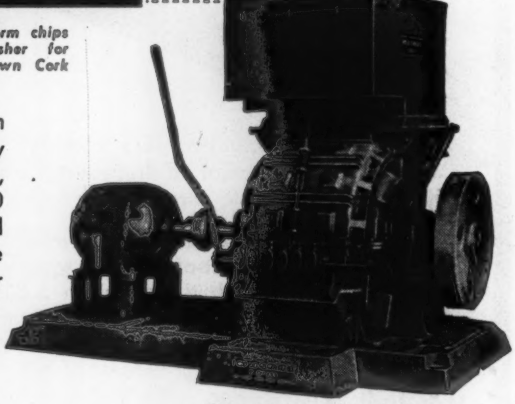
DETROIT TESTING MACHINE CO.
9390 Grinnell Avenue
DETROIT 13 MICHIGAN



CUTTING-OIL RECOVERY can buy an AMERICAN TURNINGS CRUSHER

Segregated turnings are reduced to uniform chips by an American Shredder Ring Crusher for highest cutting oil recovery at the Crown Cork and Seal Co., Baltimore.

The cutting oil reclamation from chips produced from long, curly turnings of steel, alloys, brass, aluminum, etc., increases to 30 to 50 gallons per ton. This yield *plus* the savings in storage space and handling along with higher scrap value of short shovel chips pays for an American Turnings Crusher.



Write for information bulletin reducing your turnings with an American.

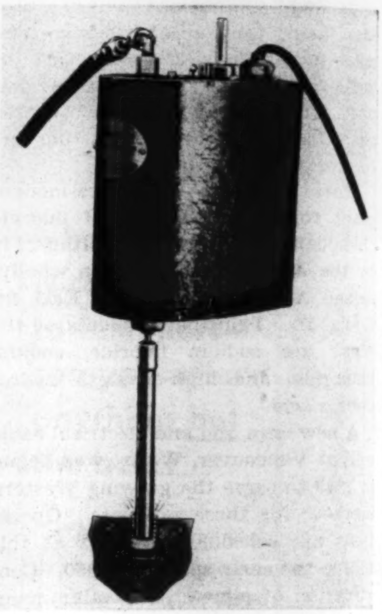
American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers

1539 MACKLIND AVE.
ST. LOUIS 10, MO.

Disintegrates Metal Rapidly

COMPACT and easily handled, the Metalmaster Junior disintegrator may be attached and operated on any standard drill press, according to its manufacturer, Clinton Machine Co., Clinton, Mich. The self-contained tool may be used for removing taps, drills, etc., from holes without distorting the threads, and for cutting shaped holes in dies.

Operation is by the process of chucking it up in a drill press, se-



lecting the proper size electrode, turning it on and, with its self-feeding fixture, letting the disintegrator operate by itself. It reportedly is capable of removing broken taps from 0.080 to 1 inch in size. Shapes of holes it will cut in carbides or any hardened metals include rounds, open squares, blind squares, hexagonals and pinion shapes.

Broach Press Easily Loaded

ROCKER type automotive door handles are broached in a setup which features easier loading and a high degree of operator safety. The equipment, developed by Colonial Broach Co., Detroit, consists of a standard bench-type Junior hydraulic 2-ton, 12-inch stroke press mounted at an angle on a special fabricated base.

Hinged guard screen covers the broaches during loading as well as during the machine cycle, the handles being inserted into broaching position through holes in the screen. Operator's hands therefore cannot come in contact with broaches during the machine operation.

Inclined angle of the press facili-

FURNACE PROBLEMS
are Frequently Solved

by REMMEY
RM
SEMISILICA BRICKS

When heating furnace roofs, open hearth regenerator roofs and hot blast stoves are operating in the temperature range of 2200F.-2700F. for sufficient time to cause "First Quality Clay Bricks" to spall and vitrify or sag—and where the performance of silica bricks is hindered by shutdowns and severe temperature changes, a need is created for REMMEY RM Semisilica bricks.

If your furnace problem falls in this category, Semisilica bricks are the answer . . . specify REMMEY RM Brand SEMISILICAS.

REMMEY
Dependable Refractories

RICHARD C. REMMEY SON CO.
Philadelphia 37, Pennsylvania

tates loading and also makes possible use of the weight of the door handles to hold the parts in position until the quick acting toggle clamps are swung into place. Thus the job of loading is simplified and floor-to-floor time is decreased.

Setup is such that the broaches, besides machining the two door handles at one time, side by side, also broach ends of the handles simultaneously. This is possible in so short a stroke by using separate sets of broaches, one above the other, for each end of each handle. An air blast makes it unnecessary for operator to swing the screen back for cleaning out of chips.

Coolant nozzles are semipermanently attached to the guard screen and connected to the piping with a ball joint in line with the screen hinges. Thus the handles stay correctly aimed and yet may be swung back out of the way with the guard screen during setup after broach sharpening. An electrical interlock prevents return of broaches to starting position until finished parts have been removed at the end of the cutting stroke.

Cold-Heading Stainless Bolts

COLD-headed bolts, recessed head screws, cold upset and punched nuts and parts requiring severe cold coining and extrusion can be produced economically from a new chrome-nickel austenitic stainless steel. The new material is reported to work-harden much more slowly than conventional 18-8 types of stainless, making it well suited to the fabrication of fastenings and similar parts by drastic cold heading or upsetting.

Developed by Carpenter Steel Co., Reading, Pa., the steel is being produced on a commercial scale in the following forms: Hot rolled bars and forgings, cold drawn and ground bars, wire and wire rods. The material, called Carpenter stainless No. 10, analyzes: Carbon 0.08 max., chromium 16 and nickel 18 per cent.

Details Indium Applications

MANY and varied uses of indium are not widely known outside of a few industries. In an effort to broaden the knowledge available, Maria Thompson Ludwick, secretary of Indium Corp. of America, New York, is preparing a book, a compilation of factual material on the metal of some very unusual uses. Containing a bibliography and illustrated with graphs and microphotographs, it will disclose characteristics and uses of indium. Availability is early in 1950.

STANDARD PICKLING PRACTICE THE WORLD AROUND!

Rodine®
Selective Inhibitors

used in the
Pickle Bath

- *Saves both acid and metal, cuts pickling costs.*
- *Promotes scale removal.*
- *Prolongs the life of the pickle bath.*
- *Prevents over-pickling.*
- *Minimizes hydrogen embrittlement.*
- *Improves pickling . . . gives a brighter, cleaner, smoother surface.*
- *Reduces acid fumes.*
- *Improves working conditions.*
- *Permits close control of pickling operations.*
- *Boosts pickling production.*

Send for further information about RODINE and how it can help your own pickling production.

American Chemical Paint Co.
AMBLER ACP PENNA

SMALL STAMPINGS

Any Metal
Any Quantity
●
30 years' experience
gives us the
"know how"

Hundreds of satisfied customers are evidence of our high quality

THE
MASTER PRODUCTS
COMPANY
6400 PARK AVE. • CLEVELAND 5, OHIO

New Books

Metals Reference Book, by Colin J. Smithells, director of research, British Aluminum Co. Ltd.; cloth, 735 pages, 6¼ x 9¼ inches; published by Interscience Publishers Inc., New York; available from STEEL, Penton Bldg., Cleveland, O., for $13.50.

This detailed and all-inclusive book provides a summary of data relating to metallurgy and metal physics, the data being presented, so far as possible, in the form of tables or diagrams with a minimum of descriptive matter. The editor veers from this policy occasionally where information cannot be otherwise adequately presented. The introductory section includes tables on abbreviations, first aid, weights and measures, conversion factors, mathematical formulae, hydrometer scales, saturated water vapor pressures, etc.

Balance of the book consists of over 30 sections, each of which is further subdivided into related subjects. A limited bibliography is presented at the end of each section so that the reader may refer to more important original sources. Section titles include: Constants of general and nuclear physics, line spectra of the elements, x-ray crystallography, geochemistry, equilibrium diagrams, general physical properties, mechanical testing and properties, refractory materials, fuels and many others.

Iron Bearing Deposits in Washington, Oregon and Idaho, by Carl Zapffe, manager, iron ore properties, Northern Pacific Railway Co., Brainerd, Minn.; cloth, 89 pages, 5¾ x 9 inches; published by Raw Materials Survey, 701 Woodlark Bldg., Portland 5, Ore.; available from STEEL, Penton Bldg., Cleveland, for $2.50.

Few men in the United States are better qualified to speak with authority on local iron ores in the Northwest states—their deposits, exploration, beneficiation and quality—than Carl Zapffe. In his most recent contribution he presents hitherto unpublished data and brings together a wealth of scattered information on the subject.

Local iron ores are described and catalogued to indicate their utility rather than to attempt to persuade some company to erect a blast furnace in that area. Nine types of iron ores and 18 localities are described and in none of these deposits is there much resemblance to standard iron ores smelted in American blast furnaces. The author merely presents the material from the standpoint of

MARKS that won't come off!

Here's the "perfect pair" to solve all your hot metal marking problems. Especially developed, after years of research, for steel mills and metal working plants.

HOTMARX
REG. U. S. PAT. OFF.
for metals from 800° to 2000°

METALMARK
for metals to 800°

HOTMARX

Where ordinary markers would flame up and burn, Hotmarx marks clearly and easily up to 2000° without smoking or running. Marks withstand weathering.

METALMARK

For all types of marking, checking or grading where hot metal up to 800° is handled. Of highest quality, retains its smooth, clear, legible marks after metal cools. Highly weather-proof.

NEW INDUSTRIAL CRAYON GUIDE

FREE 16-page booklet, illustrating in color the COMPLETE Old Faithful line of markers needed in industry . . . shows the right marker for every surface and purpose. Send today!
Dept. L-34

the AMERICAN CRAYON company

making the metal in accordance with conventional melting practices at various plants in this country.

The review gives the characteristics of various grade ores and includes 34 tables of chemical analyses, possible tonnages available, beneficiation requirements and marketing procedures. This is an important feature of the review in that it gives the reader the clue as to what application an ore found in this section of our country may have in industry.

Mr. Zapffe directs attention to the fact that Northwest ores are specialty ores because of the content of some element other than iron, or a rare mineral, or a combination of unique minerals, and he adds that nowhere on earth are so many different types found in so small an area as in these three states.

Chemical composition of the several ores described in the review are illustrated diagrammatically. Uniform arrangement of the chemical components has been followed to enable quick comparison between any two grades of the entire series.

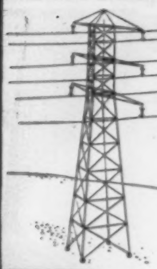
Text in Patternmaking, by Alexander V. Hanel, Boys' Technical High School, Milwaukee, Wis.; cloth, 314 pages, 6¼ x 9¼ inches; published by Bruce Publishing Co., Milwaukee, Wis.; available from STEEL, Penton Bldg., Cleveland, O., for $2.96.

Written for the student and instructor of wood patternmaking and also the apprentice patternmaker and journeyman, this book is divided into two parts. The first part presents general related information as well as pertinent specific technical data. Second part consists of jobs which are aimed to give the student training and fundamental skills and procedures, these being presented in logically graduated sequence.

As applications in patternmaking are varied, the author stresses general fundamentals as far as possible, not restricting his treatment to the specific instructions of the limited number of patterns. It is his feeling that with a sound and thorough training in fundamentals, the student is well equipped to make rapid individual progress and to do much of his own pattern planning and designing.

The first section is made up of chapters on molding and pattern allowances, tools and lumber, machinery, pattern layout, pattern joinery, etc. The second, or job section, is divided into projects covering eight semesters. A glossary of patternmaking and molding terms is included along with an index and numerous drawings and photographs.

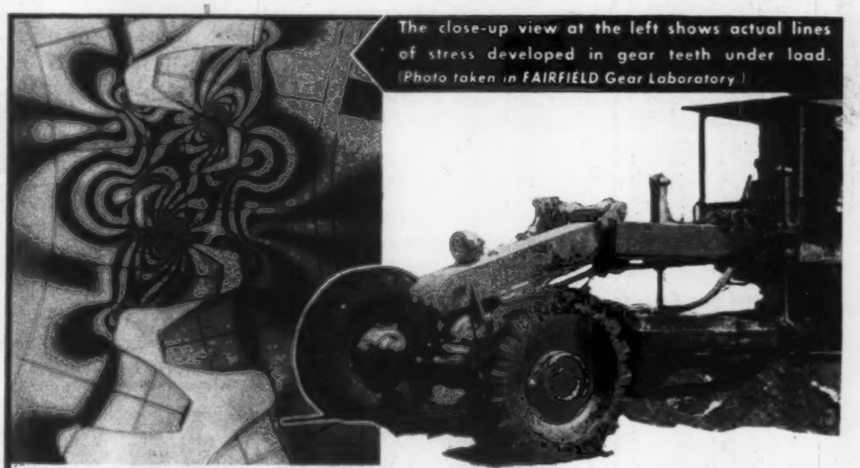
IF IT'S
IRON
OR STEEL



REMEMBER
to have it
HOT DIP GALVANIZED

(DIPPED IN MOLTEN
ZINC)

Only HOT DIP Galvanizing provides the heaviest practicable coating of zinc *inseparably bonded* to the steel. For the longest-lasting economical rust prevention, specify "Hot Dip Galvanizing" done by a member of the American Hot Dip Galvanizers Association. List of member plants available by writing to the Association's headquarters in the First National Bank Building, Pittsburgh 22, Pennsylvania.

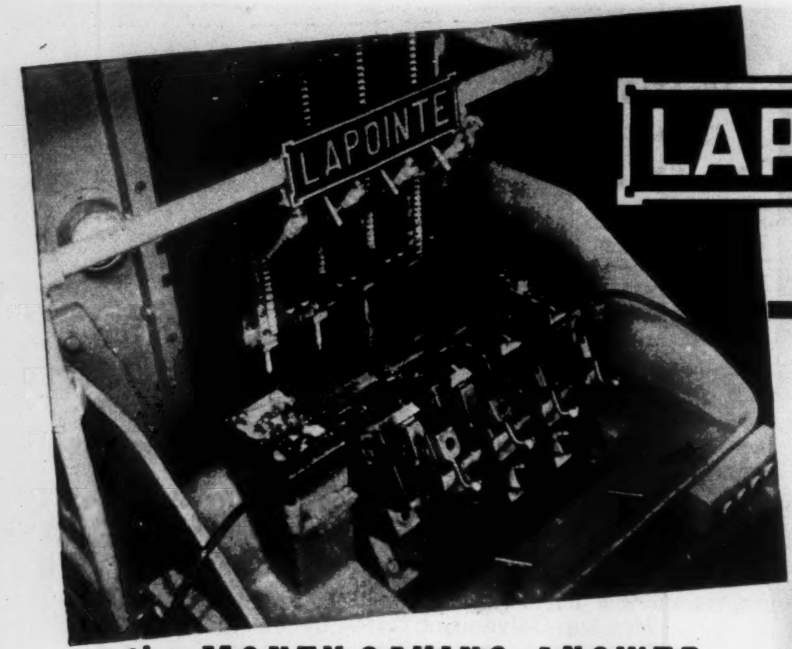


The close-up view at the left shows actual lines of stress developed in gear teeth under load. (Photo taken in FAIRFIELD Gear Laboratory.)

Helping to make a good product
Even Better!

Polarized light used with photoelastic equipment to check stresses and strains in gear teeth is just one of the many steps Fairfield takes to help make good products even better! There is no finer recommendation for the quality of the product you sell than to be able to say that it is "Equipped with FAIRFIELD GEARS!" Long producers of the gears needed in high grade trucks and tractors, Fairfield now brings the same standards for gear performance to a wide variety of products: Road Graders... Machine Tools... Diesel Engines... and a host of others. Get acquainted with FAIRFIELD! Send for interesting, illustrated brochure.

FAIRFIELD for FINE GEARS
FAIRFIELD MANUFACTURING COMPANY
303 South Earl Avenue • Lafayette, Indiana



LAPOINTE TIP-DOWN FIXTURES

...the MONEY-SAVING ANSWER

to 80% of all surface broaching installations!

TIP-DOWN FIXTURES are standard equipment on *all* Lapointe single and double ram vertical surface broaching machines, because *they offer so many important operating advantages.* Here are some of them:

TIP-DOWN Fixtures provide exceptionally easy loading and unloading, by bringing the work-holder out front *where the operator can see it and get at it.*

TIP-DOWN Fixtures do not sacrifice any of the stroke available on the machine.

TIP-DOWN Fixtures permit the use of a great variety of work holders that can be manually or hydraulically clamped.

TIP-DOWN Fixtures are constructed to permit fully adjustable work-holders to compensate for broach wear.

TIP-DOWN Fixtures are ruggedly built, having the same sturdy characteristics as the Lapointe Surface Broaching Machine.

THESE FIXTURES ARE F-A-S-T

They're so easy to load that you just *naturally* get greater production through greater speed . . . and without fatigue. You don't tie yourself into a knot, loading a Lapointe Tip-Down Fixture!

WE SUGGEST you write today for descriptive circular on Lapointe vertical broaching machines and tip-down fixtures. Ask for Bulletin DRV-TD-3.

THE *Lapointe* MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory • Edgware • Middlesex • England

HUDSON
LAPOINTE
MASS.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

Market Summary

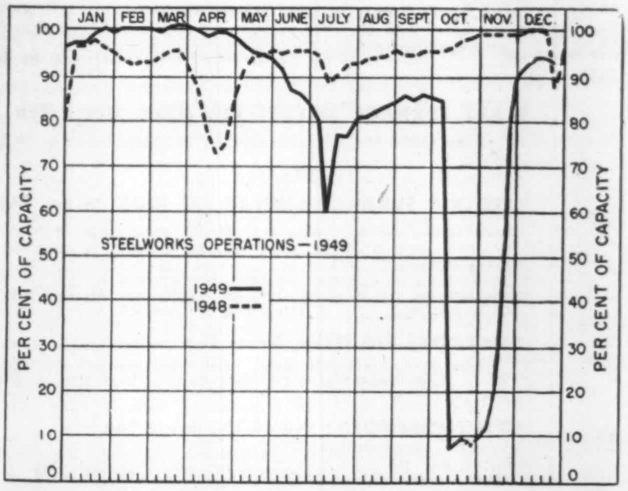
NINETEEN-FIFTY opens on a high note in the steel markets. Mill order backlogs are heavy, especially in the light, flat-rolled products, wire and pipe. Ingot production is booming along above 93 per cent of capacity. First quarter steel output should be among the largest on record. Consumer pressure for a few products is reminiscent of the shortage days of 1947-48. Upward price adjustments, initiated in mid-December, have not been fully digested by consumers but no sign had yet appeared to indicate demand has been adversely affected by the advances. On the whole, the outlook at turn of year is encouraging despite a measure of uncertainty with respect to market conditions beyond March. Steelmakers' hopes for sustained demand and production are buoyed by promising prospects for continued high-level activity in the automotive and building industries.

PRODUCTION— Steel production last year fell substantially below that of 1948. Output is estimated at 77.6 million tons, down more than 11 million from the year preceding. Finished steel shipments are estimated around 57.8 million tons. Despite the drop, due to demand shrinkage following satisfaction of the huge pentup needs accumulated during the war, and to the production lost during the steel strike, output was third largest for peacetime.

SUPPLY— Tight market situation is expected in sheets and strip beyond first quarter. Most producers are booked up for that period, and, in a few instances, through first half. Pressure of demand in this area of the market is so great sellers could book to capacity beyond June if they were so disposed. Wire and pipe also will continue tight for some months. In other products, however, supply promises to be noticeably easier, notably plates. Deliveries of the latter can be had within three to four weeks. Structural shapes, except for wide flange sections, are not under too great pressure at the moment and fabricators' backlogs are likely to undergo further shrinkage before an upturn sets in. This should come in the spring. Steel bars are moderately tight, though openings in first quarter rolling schedules are reported.

PRICES— Isolated announcements of price advances continue to be made as steelmakers follow the action initiated by the larger interests in mid-December. As a general thing, the market now is firmly established on the higher level with those makers not yet having taken action expected to do so within a week at most. Meanwhile, metalworking shops are busy trying to figure out the impact of the increases on their costs. Some will be hit harder than others but the story will not be known until extra cards are available from all producers. Expectations are an attempt will be made to absorb the increases, especially where competitive conditions argue against price increases. Absorption will be impossible in all cases, however, and where necessary the higher costs are likely to be passed along to the ultimate consumers. More careful ordering and specifying by steel buyers to avoid increased extra charges is expected with resulting increase in production and purchasing efficiency. Engineering and design are likely to be noticeably affected as manufacturers seek to get around the higher steel costs.

COMPOSITES— STEEL's weighted index on finished steel rose slightly higher last week to 156.92 from 156.83 the preceding week. A year ago this index stood at 151.86. The arithmetical price composite on finished steel advanced to $92.18 from $92.09 and compared with $95.50 last year. The current composites are preliminary pending publication of all producers' new prices. Easiness again characterized the scrap market with the composite on steelmaking grades declining to $26.92 from $27.25 and comparing with $43.25 a year ago. Composites on pig iron held unchanged.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Dec. 31	Change	Same Week 1948	Same Week 1947
Pittsburgh	94	— 2.5*	94.5	102
Chicago	95.5	— 3*	99	94
Eastern Pa.	78	— 7	83.5	92
Youngstown	102	+ 4	105	102
Wheeling	96.5	+ 5.5	92.5	90.5
Cleveland	102	+ 2.5*	96	91
Buffalo	103.5	None	101	87.5
Birmingham	100	None	100	99
New England	81	— 4	86	83
Cincinnati	104	None	99	89
St. Louis	89.5	None	77.5	89.5
Detroit	98	— 8	99	92
Western	87	— 3	..	..
Estimated national rate	93.5	— 1	97.5	97

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947.

* Change from revised rate.

Composite Market Averages

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.92*	156.83	152,52	151,86	99.16
Index in cents per lb ..	4.251	4.249	4.132	4.114	2.686
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$92.18*	$92.09	$91.64	$95.50	$56.73
No. 2 Fdry Pig Iron, GT	46.10	46.10	46.10	46.69	23.67
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.41	24.29
Basic Pig Iron, GT	45.60	45.60	45.60	46.29	23.00
Steelmaking Scrap, GT..	26.92	27.25	29.83	43.25	19.17

---

* Preliminary

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh...	3.45	3.45	3.35	3.35–55	2.15
Bars, H.R., Chicago	3.35	3.35	3.35	3.35	2.15
Bars, C.F., Pittsburgh	3.95-4.00	3.95-4.00	3.95-4.00	3.95-4.25	2.65
Bars, C.F., Chicago.......	4.00	4.00	4.00	4.00	2.65
Shapes, Std., Pittsburgh ..	3.40	3.40	3.25	3.25–30	2.10
Shapes, Std., Chicago	3.25	3.25	3.25	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.40	3.40–60	2.10
Plates, Chicago	3.40	3.40	3.40	3.40	2.10
Plates, Coatesville, Pa. ..	3.60	3.60	3.50	3.75	2.10
Plates, Sparrows Point, Md.	3.50	3.50	3.40	3.45	2.10
Plates, Claymont, Del.	3.60	3.50	3.50	3.95	2.10
Sheets, H.R., Pittsburgh ..	3.35	3.35	3.25	3.25–30	2.10
Sheets, H.R., Chicago	3.25	3.25	3.25	3.25	2.10
Sheets, C.R., Pittsburgh ..	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Chicago......	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Detroit	4.20	4.20	4.20	4.20	3.15
Sheets, Galv., Pittsburgh..	4.40	4.40	4.40	4.40	3.50
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh....	4.00	4.00	4.00	4.00–75	2.80
Strip, C.R., Chicago	4.00–15	4.00–15	4.00–15	4.00–25	2.90
Strip, C.R., Detroit	4.20–40	4.20–25	4.20–25	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.50	4.50	4.15	4.15–4.50	2.60
Nails, Wire, Pittsburgh ...	5.30	5.30	5.15	5.15–6.30	2.55
Tin plate, box, Pittsburgh.	$7.75	$7.75	$7.75	$6.80	$5.00

SEMIFINISHED

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Billets, forging, Pitts.(NT)	$63.00	$63.00	$61.00	$61.00	$40.00
Sheet bar, mill (NT)	51.78–57.00	51.78–57.00	51.78–57.00	67.00	34.00
Wire rods, $\frac{7}{32}$-⅜", Pitts. ..	3.85	3.85	3.40	3.40–4.15	2.00

PIG IRON, Gross Ton

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.17	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00–46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.67	25.84
No. 2 Fdry, Birmingham..	39.38	39.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.09	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

---

* Delivered, Pittsburgh.

SCRAP, Gross Ton

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
No. 1 Heavy Melt. Pitts. ..	$30.00	$30.00	$32.00	$42.75	$21.00
No. 1 Heavy Melt. E. Pa. .	23.75	24.75	26.00	45.25	18.75
No. 1 Heavy Melt. Chicago	27.00	27.00	29.50	41.75	19.75
No. 1 Heavy Melt. Valley..	30.25	30.75	32.75	42.75	20.00
No. 1 Heavy Melt. Cleve..	27.25	28.75	30.25	42.25	19.50
No. 1 Heavy Melt. Buffalo	29.75	29.75	29.75	48.50	19.25
Rails, Rerolling, Chicago.	41.50	43.50	44.50	69.50	22.25
No. 1 Cast, Chicago......	38.50	37.50	42.50	67.50	20.00

COKE, Net Ton

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Beehive, Furn., Connlsvl. .	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.50	15.50	15.75	17.00	7.75
Oven Fdry., Chicago	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

	Dec. 29 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis........	9.75	9.75	9.75	17.50	8.25
Lead, St. Louis	11.80	11.80	11.80	21.30–35	6.35
Tin, New York	78.00	78.00	83.00	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	32.00	38.50	14.50
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del.	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham,Ala. R2, S9	38.88	39.38	....	....
Woodward,Ala. W15	38.88	39.38	....	....
Cincinnati,del.	....	46.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y. W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston,del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
So.Chicago,Ill. Y1	46.00	46.50	46.50	....
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del.	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts.N.&S. sides, Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y. R2	48.00	48.50	49.00	....
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.,del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%)

Jackson,O. J1, G2	$59.50
Buffalo H1	60.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk,Iowa, OH & Fdry., 12½ lb. piglets, frt. allowed K2.	82.00
Wenatchee,Wash., OH & Fdry, frt. allowed K2............	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, Intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Dec. 29, 1949; cents per pound unless otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 ....$50.00
Munhall,Pa. C3 ....50.00

INGOTS, Alloy (NT)
Detroit R7 ....$51.00
Houston,Tex. S5 ......59.00
Midland,Pa. C18 ......51.00
Munhall,Pa. C3 ....51.00
So.Duquesne,Pa. C3 ...51.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. C3 .....$53.00
Clairton,Pa. C3 ....53.00
Conshohocken,Pa. A3 ..57.00
Ensley,Ala. T2 ....53.00
Farfield,Ala. T2 ......53.00
Fontana,Cal. K1 ....71.00
Gary,Ind. C3 ....53.00
Johnstown,Pa. B2 ......53.00
Lackawanna,N.Y. B2 ...53.00
Munhall,Pa. C3 ....53.00
Sharon,Pa. S3 ....57.00
So.Chicago,Ill. C3 ....53.00
So.Duquesne,Pa. C3 ...53.00

Carbon, Forging (NT)
Bessemer,Pa. C3 .....$63.00
Buffalo R2 ....63.00
Canton,O. R2 ....63.00
Clairton,Pa. C3 ....63.00
Cleveland R2 ....63.00
Conshohocken,Pa. A3 ..63.00
Detroit R7 ....61.00
Ensley,Ala. T2 ....63.00
Fairfield,Ala. T2 .....63.00
Fontana, Calif. K1 ....80.00
Gary,Ind. C3 ....63.00
Geneva,Utah G1 ....63.00
Houston,Tex. S5 ....69.00
Ind.Harbor,Ind. I-2 63.00
Johnstown,Pa. B2 ......63.00
Lackawanna,N.Y. B2 ..63.00
Munhall,Pa. C3 ....63.00
So.Duquesne,Pa. C3 ...63.00
So.Chicago,Ill. C3, R2..63.00
Warren,O. C17 ....61.00

Alloy (NT)
Bethlehem,Pa. B2 $66.00
Buffalo R2 ....63.00
Canton,O. R2 ....63.00
Canton,O. T7 66.00
Conshohocken,Pa. A3 ..65.00
Detroit R7 ....63.00
Fontana,Calif. K1 .....82.00
Gary,Ind. C3 ....63.00
Houston,Tex. S5 ....71.00
Johnstown,Pa. B2 ......63.00
Lackawanna,N.Y. B2 66.00
Massillon,O. R2 ....63.00
Midland,Pa. C18 ....66.00
Munhall,Pa. C3 ....63.00
Sharon,Pa. S3 ....66.00
So.Chicago,Ill. C3, R2..63.00
So.Duquesne,Pa. C3 ...63.00
Warren,O. C17 ....63.00

SHEET BARS (NT)
Mansfield,O. E6 (GT).$58.00
Sharon,Pa. S3 ....57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ....$76.00
Cleveland R2 ....76.00
Ind.Harbor,Ind. I-2 ...76.00
Massillon,O. R2 ....76.00
So.Chicago,Ill. R2 ....76.00

SKELP
Aliquippa,Pa. J5 ......3.15
Munhall,Pa. C3 ....3.15
Warren,O. R2 ....3.15
Youngstown C3, R2 ....3.15

WIRE RODS
AlabamaCity,Ala. R2 ...3.85
Buffalo W12 ....3.40
Cleveland A7 ....3.85
Donora,Pa. A7 ....3.85
Fairfield,Ala. T2 .....3.85
Houston,Tex. S5 ....3.95
Ind.Harbor,Ind. Y1 ....3.85
Johnstown,Pa. B2 3.85
Joliet,Ill. A7 ....3.85
Los Angeles B3 ....4.20
Monessen,Pa. P7 ....3.85
Pittsburg,Calif. C11 ..4.50
Portsmouth,O. P12 .....3.40
So.Chicago,Ill. R2 ....3.85
SparrowsPoint B2 3.95
Sterling,Ill.(1) N15 3.85
Struthers,O. Y1 ....3.85
Torrance,Calif. C11 ...4.65
Worcester,Mass. A7 ....4.15

STRUCTURALS
Wide Flange
Bethlehem,Pa. B2 ......3.45
Lackawanna,N.Y. B2 ...3.45
Munhall,Pa. C3 ....3.40
So.Chicago,Ill. C3 ....3.40

H-S., L-A. Wide Flange
Munhall,Pa. C3 ....5.10
So.Chicago,Ill. C3 ....5.10

H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 ......5.15
Bessemer,Ala. T2 ......5.15
Bethlehem,Pa.(14) B2 ..5.20
Clairton,Pa. C3 ....5.15
Fairfield,Ala. T2 .....5.15
Fontana,Calif. K1 .....5.50
Gary,Ind. C3 ....5.15
Ind.Harbor,Ind. I-2 5.15
Ind. Harbor,Ind Y1 ....5.15
Johnstown,Pa. B2 ......5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa.(14) C3 ....5.15
So.Chicago,Ill.(14) C3 ..5.15
Struthers,O. Y1 ...... 5.15

Carbon Steel Stand. Shapes
Aliquippa,Pa: J5 ......3.40
Bessemer,Ala. T2 ......3.40
Bethlehem,Pa. B2 ......3.30
Clairton,Pa. C3 ....3.40
Fairfield,Ala. T2 .....3.40
Fontana,Calif. K1 .....3.80
Gary,Ind. C3 ....3.40
Geneva,Utah G1 ....3.40
Houston, Tex. S5 ......3.65
Ind.Harbor,Ind. I-2 3.40
Johnstown,Pa. B2 ......3.30
KansasCity,Mo. S5 .....3.85
Lackawanna,N.Y. B2 ..3.30
LosAngeles B3 4.00
Minnequa,Colo. C10 ....3.75
Munhall,Pa. C3 ....3.40
Niles,Calif. (22) P1 ..3.97
Phoenixville,Pa. P4 ...3.30
Portland,Oreg. O4 .....3.90
Seattle B3 4.05
So.Chicago,Ill. C3 ....3.40
So.Chicago,Ill. W14 ...3.25
So.SanFrancisco B3 3.95
Torrance,Calif. C11 ...4.00
Weirton,W.Va. W6 ......3.40

Alloy Stand. Shapes
Clairton,Pa. C3 ....4.05
Fontana,Calif. K1 .....5.25
Munhall,Pa. C3 ....4.05
So.Chicago,Ill. C3 ....4.05

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 4.20
Lackawanna,N.Y. B2 ..4.05
Munhall,Pa. C3 ....4.20
So.Chicago,Ill. C3 ....4.20
Weirton,W.Va. W6 ......4.05

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.50
Aliquippa,Pa. J5 ......3.50
Ashland,Ky.(15) A10 ...3.40
Bessemer,Ala. T2 ......3.50
Clairton,Pa. C3 ....3.50
Claymont,Del. W16 3.60
Cleveland J5, R2 ......3.50
Coatesville,Pa. L7 ....3.60
Conshohocken,Pa. A3 ..3.50
Ecorse,Mich. G5 ....3.65
Fairfield,Ala. T2 .....3.50
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 ....3.50
Geneva,Utah G1 ....3.50
Harrisburg,Pa. C5 .....3.75
Houston,Tex. S5 ....3.80
Ind.Harbor,Ind. I-2 3.50
Ind.Harbor,Ind Y1 .....3.50
Johnstown,Pa. B2 ......3.50
Lackawanna,N.Y. B2 ...3.50
Minnequa,Colo. C10 ....4.30
Munhall,Pa. C3 ....3.50
Pittsburgh J5 ....3.50
Seattle B3 4.40
Sharon,Pa. S3 ....3.50
So.Chicago,Ill. W14 ...3.40
So.Chicago,Ill. C3 ....3.50
SparrowsPoint,Md. B2 ..3.50
Steubenville,O. W10 ...3.50
Warren,O. R2 ....3.50
Weirton,W.Va. W6 ......3.50
Youngstown C3, Y1 ...3.50

PLATES (Universal Mill)
Fontana,Calif. K1 .....4.30

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 ....4.50
Conshohocken,Pa. A3 ..4.40
Fontana,Calif. K1 .....5.40
Gary,Ind. C3 ....4.40
Johnstown,Pa. B2 ......4.40
Munhall,Pa. C3 ....4.40
Sharon,Pa. S3 ....4.40
So.Chicago,Ill. C3 ....4.40
SparrowsPoint,Md. B2 ..4.40

PLATES, Ingot Iron
Ashland,cl(15) A10 ....3.65
Ashland,lcl(15) A10 ...4.15
Cleveland,cl R2 ....4.10
Warren,O.,cl R2 ....4.10

PLATES, Wrought Iron
Economy,Pa. B14 ....7.85

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 ......5.35
Bessemer,Ala. T2 ......5.35
Clairton,Pa. C3 ....5.35
Cleveland J5, R2 ......5.35
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 ....5.45
Fairfield,Ala. T2 .....5.35
Fontana,Calif. K1 .....5.80
Gary,Ind. C3 ....5.35
Geneva,Utah G1 ....5.35
Houston,Tex. S5 ....5.60
Ind.Harbor,Ind. I-2 5.35
Ind.Harbor,Ind. Y1 ....5.35
Johnstown,Pa. B2 ......5.35
Munhall,Pa. C3 ....5.35
Pittsburgh J5 ....5.35
Sharon,Pa. S3 ....5.35
So. Chicago,Ill C3 ....5.35
SparrowsPoint,Md. B2 ..5.35
Warren,O. R2 ....5.35
Youngstown Y1 ....5.35

FLOOR PLATES
Cleveland J5 ....4.55
Conshohocken,Pa. A3 ...4.55
Harrisburg,Pa. C5 .....4.55
Ind.Harbor,Ind. I-2 ...4.55
Munhall,Pa. C3 ....4.55
So.Chicago,Ill. C3 ....4.55

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ...3.45
Aliquippa,Pa. J5 ......3.45
Alton,Ill. (1) L1 .....3.35
Ashland,Ky. (17) A10..3.35
Atlanta,Ga. A11 ....3.50
Bessemer,Ala. T2 ......3.45
Buffalo R2 ....3.45
Canton,O. R2 ....3.45
Clairton,Pa. C3 ....3.45
Cleveland R2 ....3.45
Ecorse,Mich. G5 ....3.55
Emeryville,Calif. J7 ..4.10
Fairfield,Ala. T2 .....3.45
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 ....3.45
Houston,Tex. S5 ....3.75
Ind.Harbor,Ind. I-2 3.45
Johnstown,Pa. B2 ......3.45
KansasCity,Mo. S5 .....3.95
Lackawanna,N.Y. B2 ...3.45
LosAngeles B3 4.15
Marion,O. P11 ....3.35
Midland,Pa. C18 ....3.45
Milton,Pa. B6 3.45
Minnequa,Colo. C10 ....3.85
Niles,Calif. P1 ....4.05
N.Tonawanda,N.Y. B11 .3.35
Pittsburg,Calif. C11 ..4.15
Pittsburgh, J5 ....3.45
Porland,Oreg. O4 ......4.10
Seattle B3, N14 4.20
So.Chicago C3, R2 .....3.45
So.Chicago,Ill. W14 ...3.35
So.Duquesne,Pa. C3 ...3.45
S.SanFran.,Cal. B3 4.20
Struthers,O. Y1 ....3.45
Torrance,Calif. C11 ...4.15
Weirton,W.Va. W6 ......3.45
Youngstown C3, R2 ..3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ......3.45
Atlanta A11 3.60
Bethlehem,Pa.(2) B2 ...3.65
Johnstown,Pa. B2 ......3.35
Lackawanna,N.Y. B2 ...3.35
Niles,Calif. P1 ....4.05
Pittsburgh(23) J5 .....3.45
Portland,Oreg. O4 .....4.10
SanFrancisco S7 ....3.90
Weirton,W.Va. W6 ......3.35

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ......3.95
Buffalo R2 ....3.95
Canton,O. R2 ....3.95
Canton,O. T7 3.95
Clairton,Pa. C3 ....3.95
Ecorse,Mich. G5 ....4.05
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 ....3.95
Houston,Tex. S5 ....4.15
Ind.Harbor,Ind. I-2 3.95
Ind.Harbor,Ind. Y1 ....3.95
Johnstown,Pa. B2 ......3.95
KansasCity,Mo. S5 .....4.35
Lackawanna,N.Y. B2 ...3.95
LosAngeles B3 5.00
Massillon,O. R2 ....3.95
Midland,Pa. C18 ....3.95
So.Chicago C3, R2 .....3.95
So.Chicago,Ill. W14 ...3.75
So.Duquesne,Pa. C3 ...3.95
Struthers,O. Y1 ....3.95
Warren,O. C17 ....3.75
Youngstown C3 ....3.95

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ....4.20
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 ....4.20
Youngstown C3 ....4.20

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ......5.20
Bessemer,Ala. T2 ......5.20
Bethlehem,Pa. B2 ......5.20
Clairton,Pa. C3 ....5.20
Cleveland R2 ....5.20
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 .....5.20
Fontana,Calif. K1 .....6.15
Gary,Ind. C3 ....5.20
Ind.Harbor,Ind. Y1 ....5.20
Ind.Harbor,Ind. I-2 5.20
Johnstown,Pa. B2 ......5.20
Lackawanna,N.Y. B2 ...5.20
Pittsburgh J5 ....5.20
So.Duquesne,Pa. C3 ..5.20
Struthers,O. Y1 ....5.20
Youngstown C3 ....5.20

BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 4.15
Ambridge,Pa. W18 4.15
BeaverFalls,Pa. R2 ...4.00
BeaverFalls,Pa. M12 4.15
Buffalo B5 ....4.00
Camden,N.J. P13 4.63
Carnegie,Pa. C12 4.15
Chicago W18 4.15
Cleveland A7, C20 ....4.00
Cumberland,Md. C19 ...3.95
Detroit P17 ....4.15
Donora,Pa. A7 ....4.00
Ecorse,Mich. G5 ....4.30
Elyria,O. W8 ....4.00
FranklinPark,Ill. N5 ..4.00
Gary,Ind. R2 ....4.00
Hammond,Ind. L2, M13–4.00
Hartford,Conn. R2 4.55
Harvey,Ill. B5 ....4.00
Indianapolis M13 ......4.20
LosAngeles R2 ....5.40
Mansfield,Mass. B5 4.55
Massillon,O. R2, R8....4.00
Midland,Pa. C18 ....4.00
Monaca,Pa. S17 4.15
Newark,N.J. W18 4.55
Plymouth,Mich. P5 ....4.25
Pittsburgh J5 ....3.95
Putnam,Conn. W18 4.55
Readville,Mass. C14 4.55
St.Louis,Mo. M5 ....4.55
So.Chicago,Ill W14 ....4.00
SpringCity,Pa.(5) K3 ..4.48
Struthers,O. Y1 ....4.00
Waukegan,Ill. A7 ......4.00
Youngstown F3, Y1 ....4.00

BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 ......4.65
Ambridge,Pa. W18 ....4.65
BeaverFalls,Pa. M12....4.65
Bthlehem,Pa. B2 ....4.65
Buffalo B5 ....4.65
Canton,O. R2 ....4.65
Canton,O. T7 4.90
Carnegie,Pa. C12 ......4.65
Chicago W18 ....4.65
Cleveland A7, C20 ....4.65
Detroit P17 ....4.80
Donora,Pa. A7 ....4.65
Elyria,O. W8 ....4.65
Gary,Ind. R2 ....4.65
Hammond,Ind. L2, M13.4.65
Hartford,Conn. R2 ....4.95
Harvey,Ill B5 ....4.65
Indianapolis M13 ......4.85
Lackawanna,N.Y. B2 ..4.65
Mansfield,Mass. B5 ...4.95
Massillon,O. R2, R8 ....4.65
Midland,Pa. C18 ....4.65
Monaca,Pa. S17 ....4.65
Newark,N.J. W18 ......4.95
So.Chicago,Ill. R2, W14.4.65
Struthers,O. Y1 ....4.65
Waukegan,Ill. A7 ......4.65
Worcester,Mass. A7 ...4.95
Youngstown F3, Y1 ...4.65

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ...3.45
Alton,Ill.(6) L1 ......3.35
Atlanta,Ga. A11 3.60
Buffalo R2 ....3.45
Cleveland R2 ....3.45
Emeryville,Calif. J7 ..4.10
Fairfield,Ala. T2 .....3.45
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 ....3.45
Houston,Tex. S5 ....3.75
Ind.Harbor,Ind. I-2 3.45
Ind.Harbor,Ind. Y1 ....3.45
Johnstown,Pa. B2 ......3.45
KansasCity, Mo. S5 ....3.95
Lackawanna,N.Y. B2 ...3.45
LosAngeles B3 ....4.05
Minnequa,Colo. C10 ....4.25
Niles,Calif. P1 ....4.05
Pittsburg,Calif. C11 ..4.15
Pittsburgh J5 ....3.45
Portland,Oreg. O4 .....4.10
Seattle,Wash. B3, N14 4.20
So.Chicago,Ill R2 .....3.45
So.Duquesne,Pa. C3 ....3.45
So.SanFrancisco B3 ....4.10
SparrowsPoint,Md. B2 ..3.45
Struthers,O. Y1 ....3.45
Torrance,Calif. C11 ...4.15
Youngstown C3, R2 ....3.45

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 ..4.50
Johnstown, ¼-1" B2 ...4.25
LosAngeles B3 ....5.00
Marion,O. P11 ....4.25
Pittsburgh J5 ....4.25
Seattle B3, N14 ....5.00
So.SanFrancisco B3 ....5.00
SparrowsPt.,1⅛-1¼" B2.4.83
SparrowsPt.,¼-1" B2 ..4.25

RAIL STEEL BARS
ChicagoHts.,Ill.(3) I-2 3.45
FortWorth,Tex.(26) T4..4.33
Hntngtn,W.Va.(3) W7 ..3.35
Moline,Ill.(3) R2 .....3.35
Williamsport(2,3) S19 3.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14.9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Stablt) B14..11.30
McK.Rks.(S.R.) L5 ....8.60
McK.Rks.(D.R.) L5...11.25
McK.Rks.(Staybolt) L5.12.75

SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 ...3.35
Ashland,Ky.(8) A10 ....3.25
Butler,Pa. A10 ....3.25
Cleveland J5, R2 ......3.35
Conshohocken,Pa. A3 ...3.35
Ecorse,Mich.(8) G5 ....3.45
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.15
Gary,Ind. C3 ....3.35
Ind.Harbor,Ind. I-2 3.35
Ind.Harbor, Ind. Y1 ...3.35
Irvin,Pa. C3 ....3.35
Kokomo,Ind. C16 ....3.35
Lackawanna,N.Y. B2 ..3.35
Munhall,Pa. C3 ....3.35
Niles,O. M4 ....3.75
Pittsburg,Calif. C11 ..4.05
Pittsburgh J5 ....3.35
Sharon,Pa. S3 ....3.35
So.Chicago,Ill. W14 ...3.25
SparrowsPoint,Md. B2 ..3.35
Steubenville,O. W10 ...3.35
Torrance,Calif. C11 ...4.05
Warren,O. R2 ....3.35
Weirton,W.Va. W6 ......3.35
Youngstown C3, Y1 ....3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity, Ala. R2 ..4.50
Dover,O. R1 ....5.00
Ind.Harbor,Ind. I-2 4.40
Mansfield,O. E6 ....4.15
Niles,O. N12 ....4.15
Niles,O. M4 ....4.65
Torrance, Calif. C11 ...5.15

SHEETS, Cold-Rolled Steel (Commercial Quality)
Butler,Pa. A10 ....4.00
Cleveland J5, R2 ......4.10
Ecorse,Mich. G5 ....4.20
Fairfield,Ala. T2 .....4.10
Follansbee,W.Va. F4 ..4.10
Fontana, Calif. K1 ....4.90
Gary,Ind. C3 ....4.10
GraniteCity,Ill. G4 4.30
Ind.Harbor,Ind. I-2 4.10
Ind.Harbor.Ind. Y1 ....4.10
Irvin,Pa. C3 ....4.10
Lackawanna,N.Y. B2 ..4.10
Middletown,O. A10 ....4.00
Pittsburg,Calif. C11 ...5.05
Pittsburgh J5 ....4.10
SparrowsPoint,Md. B2 ..4.10
Steubenvill,O. W10 ....4.10
Warren,O. R2 ....4.10
Weirton,W.Va. W6 .....4.10
Youngstown Y1 ....4.10

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ......6.20
Ecorse,Mich. G5 ....6.25
Fontana,Calif. K1 .....6.95
Gary,Ind. C3 ....6.20
Ind.Harbor,Ind Y1 ....6.20
Ind.Harbor,Ind. I-2 6.20
Irvin,Pa. C3 ....6.20
Lackawanna,N.Y. B2 ...6.20
Pittsburgh J5 ....6.20
SparrowsPoint,Md. B2 ..6.20
Warren,O. R2 ....6.20
Weirton,W.Va. W6 ....6.20
Youngstown Y1 ....6.20

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2	5.05
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	5.05
Fontana,Calif. K1	6.64
Gary,Ind. C3	5.05
Ind.Harbor,Ind. I-2	*5.05*
Ind.Harbor,Ind. Y1	5.05
Irvin,Pa. C3	5.05
Lackawanna,N.Y. B2	5.05
Pittsburgh J5	5.05
Sharon,Pa. S3	5.05
So.Chicago,Ill. C3	5.05
SparrowsPoint,Md. B2	5.05
Warren,O. R2	5.05
Weirton,W.Va. W6	5.05
Youngstown C3 Y1	5.05

SHEETS, Gal'zd No. 10 Steel

AlabamaCity, Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.65
Dover,O. R1	5.65
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	*4.50*
MartinsFerry,O W10	4.40
Niles,O. N12	4.40
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3	6.75
SparrowsPoint,Md. B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	4.95

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.25
Niles,O. R2 (28)	5.25
Weirton,W.Va. W6	5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Culvert, No. 16 flat

	Cu Alloy	Cu Fe
Ashland A10	5.00	...
Canton,O. R2	5.25	5.70
Fairfield,Ala. T-2	5.20	5.45
Gary C3	5.20	5.45
GraniteCity G4	5.40	5.70
IndianaHarbor I-2.	*5.20*	*5.45*
Irvin C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt. B2	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Flat Ingot Iron

Ashland,Ky. A10	5.25

SHEETS, Well Casing

Torrance,Calif. C11	4.85
Youngstown C3	3.85

SHEETS, Drum Body

Pittsburg,Calif. C11	3.95
Torrance,Calif. C11	3.95

SHEETS, ALUMINIZED

Butler,Pa. A10	7.75

SHEETS, Long Terne, Steel (No. 10; Commercial Quality)

BeechBotm, W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Weirton,W.Va. W6	4.80

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville,O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	*$6.60*
Gary,Ind. C3	*6.50*
Ind.Harbor. I-2	6.65
Irvin,Pa. C3	*6.50*
Weirton,W.Va. W6	*6.50*
Yorkville,O. W10	6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Yorkville,O. W10	8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10	8.95

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	*$6.35*	*$6.60*	*$6.85*
Fairfield,Ala. T2	*6.45*	*6.70*	*6.95*
Gary,Ind. C3	*6.35*	*6.60*	*6.85*
GraniteCity,Ill. G4	6.65	6.90	7.20
Ind. Harbor, Ind. Y1	*6.35*	*6.60*	*6.85*
Irvin,Pa. C3	*6.35*	*6.60*	*6.85*
Niles,O. R2	*6.35*	*6.60*	*6.85*
Pittsburg,Calif. C11	*7.10*	*7.35*	*7.60*
SparrowsPoint,Md. B2	6.55	6.80	7.10
Weirton,W.Va. W6	*6.35*	*6.60*	*6.85*
Yorkville,O. W10	*6.35*	*6.60*	*6.85*

SHEETS, SILICON (24 Ga. Base)

	Field	Arm.	Elec.	Motor	Dyn.
BeechBottom,W.Va. W10 (27)					
Cut Lengths	...	6.45	6.95	7.95	8.75
Coils	...	6.95	7.45	8.45	9.25
Brackenridge,Pa. A4 (27)					
Cut lengths	...	...	6.95	7.95	8.75
Coils	...	...	7.45	8.45	9.25
Follansbee,W.Va. F4	...	...	7.70	8.45	9.25
GraniteCity,Ill. G4			*7.15*	*8.15*	...
Ind.Harbor,Ind. I-2	*5.90*	*6.20*	*6.70*	...	...
Mansfield,O. E6	5.15	5.45	5.95	6.70	...
Niles,O. M4	5.65	5.95	6.45	...	...
Niles,O. N12	...	5.45	5.95	...	...
Toronto,O. F4	...	...	7.70	8.45	9.25
Vandergrift,Pa. C3 (27)					
Cut Lengths	...	6.45	6.95	7.95	8.75
Coils	...	6.95	7.45	8.45	9.25
Warren,O. R2	...	6.45	6.95	7.95	...
Zanesville,O. A10	...	5.45	5.95	6.70	7.50

COILS AND CUT LENGTHS, Cold-Rolled, Silicon

	Field	Arm.	Elec.	Motor	Dyn.
Warren,O. R2	6.65	6.95	7.45	8.45	9.25

SHEETS, Silicon Transformer Grade

	72	65	58	52
BeechBottom,W.Va. W10 (27)				
Cut lengths	*9.30*	*9.85*	*10.55*	*11.35*
Coils	*9.80*	*10.35*	*11.05*	*11.85*
Brackenridge,Pa. A4 (27)				
Cut Lengths	9.30	9.85	10.55	....
Coils	9.80	10.35	11.05	....
Follansbee,W.Va. F4	9.80	10.35	11.05	11.85
Toronto,O. F4	9.80	10.35	11.05	11.85
Vandergrift,Pa. C3 (27):				
Cut Lengths	9.30	9.85	10.55	11.35
Coils	9.80	10.35	11.05	11.85
Zanesville,O. A10	8.05	8.60	9.30	10.10

COLD-REDUCED COILS and Cut Lengths, Silicon

	72	T-100	T-90	T-80
Butler,Pa. A10	...	12.35	13.60	14.85
Vandergrift,Pa. C3 (27)	...	12.35	13.60	14.85
Warren,O. R2	9.80	....	....	....

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.50
Cleveland R2	3.95
Ind.Harbor,Ind. I-2	*3.60*
Warren,O. R2	3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.70
Middletown,O. A10	4.50
Warren,O. R2	4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	*4.80*

SHEETS, ZINCGRIP No. 10 Flat, Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron, No. 12

Ashland,Ky.(8) A10	$4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.90
Youngstown Y1	4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	*$5.60*
Fairfield,Ala. T2	*5.70*
Gary,Ind. C3	*5.60*
GraniteCity,Ill. G4	5.95
Ind.Harbor,Ind. Y1	*5.60*
Irvin,Pa. C3	*5.60*
Niles,O. R2	*5.60*
Pittsburg,Calif. C11	*6.35*
SparrowsPoint,Md. B2	5.85
Warren,O. R2	*5.60*
Weirton,W.Va. W6	*5.60*
Yorkville,O. W10	*5.60*

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	*$7.30*	*$7.50*
Fairfield,Ala. T2	*7.40*	*7.60*
Gary C3	*7.30*	*7.50*
Gran.City,Ill. G4	7.70	7.95
Ind.Harb. Y1	*7.30*	*7.50*
Irvin,Pa. C3	*7.30*	*7.50*
Pitts.Cal. C11	*8.05*	*8.25*
Sp.Pt.,Md. B2	*7.40*	*7.60*
Warren R2	*7.30*	*7.50*
Weirton W6	*7.30*	*7.50*
Yorkville,O. W10	*7.30*	*7.50*

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	4.75

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.60

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa.(9) S18	3.50
Conshohocken,Pa. A3	3.35
Detroit M1	3.45
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.30
Pittsburg,Calif. C11	4.00
Riverdale,Ill. A1	3.25
SanFrancisco S7	3.90
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3 Y1	3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15	9.50
Pawtucket,R.I.(11) N8	9.50
Pawtucket,R.I.(12) N8	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Carbon

Berea,O. C7	6.10
Bridgeprt,Conn.(10) S15	4.00
Butler,Pa. A10	4.00
Chicago T6	4.30
Cleveland A7, J5	4.15
Dearborn,Mich. D3	4.40
Detroit, D2	4.40
Detroit M1	4.20
Dover,O. G6	4.15
Ecorse,Mich. G5	4.20
Follansbee,W.Va. F4	4.15
Fontana,Calif. K1	4.90
Ind.Harbor,Ind. I-2	*4.30*
Lackawanna,N.Y. B2	4.15
LosAngeles C1	*5.50*
Mattapan,Mass.(21) T6	4.50
Middletown,O. A10	4.00
NewBritain(10) S15	4.00
NewCastle,Pa. B4, E5	4.00
NewHaven,Conn. A7, D2	4.65
NewKensington,Pa. A6	4.00
NewYork W3	5.00
Pawtucket,R.I.(11) N8	4.55
Pawtucket,R.I.(21) N8	4.50
Pawtucket,R.I. R3	4.50
Riverdale,Ill. A1	4.30
Sharon,Pa. S3	4.15
SparrowsPoint,Md. B2	4.15
Trenton,N.J.(13) R5	5.00
Wallingford,Conn. W2	4.50
Warren,O. T5	4.00
Warren,O. R2	4.15
Weirton,W.Va. W6	4.15
Youngstown Y1	4.15
Youngstown C8	4.00

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.20
Dover,O. G6	6.05
Ecorse,Mich. G5	6.25
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.05
Sharon,Pa. S3	6.30
SparrowsPoint,Md. B2	6.05
Warren,O. R2	6.20
Weirton,W.Va. W6	6.20
Youngstown Y1	6.05

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.15
Youngstown C8	4.00

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.40-0.60C	0.60-0.80C	0.80-1.05C	1.05-1.35C
Bridgeprt,Conn.(10) S15	4.00	5.50	6.10	8.05	10.35
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.50	6.10	8.05	10.35
Chicago T6	4.25	5.65	6.25	8.20	10.50
Cleveland A7	4.00	5.50	6.10	8.05	10.35
Dover,O. G6	4.00	5.50	6.10	7.85	10.15
Harrison,N.J. C18	...	...	6.40	8.35	10.65
Mattapan,Mass. T6	4.50	5.80	6.40	8.35	10.65
NewBritn.,Conn(10) S15	4.00	5.50	6.10	8.05	10.35
NewCastle,Pa. B4	4.00	5.50	6.10	8.05	....
NewCastle,Pa. E5	4.00	5.50	6.10	8.05	10.35
NewYork W3	...	5.80	6.40	8.35	10.65
Pawtucket,R.I. N8					
Cleve.orPitts.Base	4.55	5.50	6.10	8.05	10.35
Worcester,Mass.Base	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.00	5.50	6.10	8.05	10.35
Trenton,N.J. R5	...	6.30	6.90	8.85	11.15
Union,N.J. H6	4.40	6.35	6.35	8.30	10.50
Wallingford,Conn. W2	4.50	5.80	6.40	8.05	10.35
Weirton,W.Va. W6	4.00	5.50	6.10	8.05	10.35
Worcester,Mass. A7	4.30	5.80	6.40	8.35	10.65
Worcester,Mass. T6	4.50	5.80	6.40	8.35	10.65
Youngstown C8	4.50	5.50	6.10	8.05	10.35

Key to Producing Companies

A1	Acme Steel Co.
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A6	American Shim Steel Co.
A7	American Steel & Wire
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
A13	American Cladmetals Co.
B1	Babcock & Wilcox Tube
B2	Bethlehem Steel Co.
B3	Beth. Pac. Coast Steel
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B6	Boiardi Steel Corp.
B8	Braeburn Alloy Steel
B11	Buffalo Bolt Co.
B14	A. M. Byers Co.
C1	Calif. Cold-Rolled Steel
C3	Carnegie-Illinois Steel
C4	Carpenter Steel Co.
C5	Central Iron & Steel Div. Barium Steel Corp.
C7	Clev. Cld.Roll.MillsCo.
C8	Cold Metal Products Co.
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia Steel Co.
C12	Col. Steel & Shafting Co.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft.
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
D2	Detroit Steel Corp.
D3	Detroit Tube & Steel
D4	Disston & Sons, Henry
D6	Driver Harris Co.
E1	Eastern Gas&Fuel Assoc.
E2	Eastern Stainless Steel
E4	Electro Metallurgical Co.
E5	Elliott Bros. Steel Co.
E6	Empire Steel Co.
F2	Firth Sterling Steel
F3	Fitzsimons Steel Co.
F4	Follansbee Steel Corp.
F6	Fretz-Moon Tube Co.
G1	Geneva Steel Co.
G2	Globe Iron Co.
G3	Globe Steel Tubes Co.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
H1	Hanna Furnace Corp.
H4	Heppenstall Co.
H6	Hind Steel Co. Inc.
I-1	Igoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K5	Kidd Drawn Steel Co.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Electric Steel
L5	Lockhart Iron & Steel
L6	Lone Star Steel Co.
L7	Lukens Steel Co.

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary, Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, Cold-Rolled Flat

Chicago [illegible]	5.35
Cleveland A7	5.35
Dover,O. G6	5.15
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.00
Massillon,O. R8	5.00
Monessen,Pa. P7	5.00
Pawtucket,R.I.(11) N8	5.55
Pawtucket,R.I.(12) N8	5.50
Trenton,N.J. R5	5.80
Worcester,Mass. A7	5.65
Worcester,Mass. T6	5.30

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	7.70
Buffalo W12	7.70
Chicago W13	7.70
Cleveland A7	8.05
Fostoria,O. S1	8.20
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	7.70
Palmer,Mass. W12	8.00
Portsmouth,O. P12	7.70
Trenton,N.J. R5	8.50
Waukegan,Ill. A7	8.05
Worcester,Mass. T6	8.00
Worcester,Mass. A7	8.35

WIRE (16 gage)	An'ld. Stone	Galv. Stone
Aliquippa J5	9.05	10.55
Bartnvill(1) K4	9.05	10.55
Cleveland A7	9.40	10.90
Fostoria,O. S1	9.65	11.15
Johnstown B2	9.05	10.55
Kokomo C16	*9.60*	*10.90*
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	9.75	11.25
Prtsmth.(18) P12	9.05	10.55
SparrowsPt. B2	9.15	10.65
Waukegan A7	9.40	10.90

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	*8.05*	*8.05*	*8.30*
Buffalo W12	7.50	7.80	8.20
Cleveland A7	7.50	7.80	8.20
Donora,Pa. A7	7.50	7.80	8.20
Fostoria,O. S1	8.00	8.30	8.70
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	7.50	7.80	8.20
NewHaven,Conn. A7	7.80	8.10	8.50
Palmer,Mass. W12	7.80	8.10	8.50
Portsmouth,O. P12	7.50	7.80	8.20
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	7.50	7.80	8.20
Trenton,N.J. A7	7.80	8.10	8.50
Trenton,N.J. R5	8.00	8.30	8.70
Waukegan,Ill. A7	7.50	7.80	8.20
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester, Mass. J4	7.70	8.10	8.50

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity, Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	*4.60*
Alton,Ill.(1) L1	4.15
Bartonville,Ill.(1) K4	*4.50*
Buffalo W12	4.15
Chicago W13	4.15
Cleveland C20	4.15
Cleveland A7	4.50
Crawfrdsvil,Ind. M8	4.30
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.65
Houston S5	4.55
Johnstown,Pa. B2	*4.50*
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	4.75
Kokomo,Ind. C16	*4.60*
LosAngeles B3	5.10
Minnequa,Colo. C10	4.50
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	4.75
No.Tonawanda B11	4.18
Palmer,Mass. W12	4.45
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.15
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	*4.60*
Sterling,Ill.(1) N15	*4.50*
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. T6	4.45
Worcester,Mass. A7	4.80

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill(1) L1	5.55
Bartonville,Ill.(1) K4	*5.90*
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	6.05
Johnstown,Pa. B2	*5.90*
LosAngeles B3	6.50
Milbury,Mass.(12) N6	5.85
Monessen,Pa. P7	5.90
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.55
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	*6.00*
Struthers,O. Y1	5.90
Trenton,N.J. A7	5.85
Trenton,N.J. R5	*6.20*
Waukegan,Ill. A7	5.55
Worcester A7,J4,T6,W12	5.85

WIRE, Merchant Quality (6 to 8 gage)	An'ld	Galv.
Ala.City, R2	5.15	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	*5.25*	*5.70*
Bartnville(19) K4	*5.35*	*5.60*
Buffalo W12	4.80	...
Cleveland A7	5.15	5.60
Donora A7	5.15	5.60
Duluth A7	5.15	5.60
Fairfield T2	5.15	5.60
Crawfrdvil. M8	4.95	5.40
Houston,Tex. S5	5.20	5.65
Johnstown B2	*5.35*	*5.60*
Joliet,Ill. A7	5.15	5.60
KansasCity,Mo. S5	5.40	5.85
Kokomo C16	*5.25*	*5.70*
LosAngeles B3	5.75	...
Minnequa C10	5.15	5.60
Monessen P7	*5.35*	*5.60*
Palmer,Mass. W12	5.10	...
Pitts.,Cal. C11	6.10	6.55
Portsmth.(18) P12	4.80	5.25
Rankin A7	5.15	5.60
So.Chicago R2	5.15	5.60
So.S.Fran. C10	5.75	6.20
SparrowsPt. B2	*5.45*	*5.70*
Sterling,Ill.(1)N15	*5.35*	*5.60*
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.10	...
Worcester A7	5.45	5.90

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.20
Buffalo W12	5.20
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	*5.55*
Los Angeles B3	6.15
Monessen P7	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.50
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.20
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	*5.65*
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	*128*
Bartonville,Ill.(19) K4	*126*
Crawfordsville M8	126
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	131
Johnstown,Pa. B2	*126*
Joliet,Ill. A7	126
KansasCity,Mo. S5	135
Kokomo,Ind. C16	*128*
Minnequa,Colo. C10	130
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	123
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	*128*
Sterling,Ill.(1) N15	*126*

FENCE POSTS	Col.
Duluth A7	112
Huntington,W.Va. W7	112
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	120
Moline,Ill. R2	116
Williamspt,Pa. S19	n.t.$120

WOVEN FENCE, 9-15½ gage	Col.
Ala.City,Ala.,17-18ga. R2	191
AlabamaCity,Ala. R2	116
Aliquip.,Pa.9-14½ga. J5	116
Atlanta A11	*118*
Bartonville,Ill.(19) K4	*116*
Crawfordsvll.Ind. M8	112
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	117
Fairfield,Ala. T2	116
Johnstown,Pa. B2	*116*
Johnstn,17ga.,6? B2	*190*
Johnstn,17ga.,4? B2	*193*
Joliet,Ill. A7	116
KansasCity,Mo. S5	121
Kokomo,Ind. C16	*118*
Minnequa,Colo. C10	116
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	109
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116
Sterling,Ill.(1) N15	*116*

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	113
Atlanta A11	*114*
Bartonville,Ill.(19) K4	*113*
Chicago W13	106
Crawfordsville M8	109
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
Kokomo,Ind. C16	*115*
Minnequa,Colo. C10	113
Pittsburg,Calif. C11	137
Portmouth,O.(18) P12	106
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	130
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	*113*

NAILS & STAPLES, Stock To Dealers & Mfrs. (7)

AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	*108*
Bartonville,Ill.(19) K4	*106*
Chicago,Ill. W13	103
Cleveland A9	112
Crawfordsville M8	106
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Houston, Tex. S5	111
Johnstown,Pa. B2	*106*
Joliet,Ill. A7	106
KansasCity,Mo. S5	115
Kokomo,Ind. C16	*108*
Minnequa,Colo. C10	110
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	103
Rankin,Pa. A7	106
So.Chicago.Ill. R2	106
SparrowsPoint,Md. B2	*108*
Sterling,Ill.(1) N15	*106*
Torrance,Calif. C11	126
Worcester,Mass. A7	112

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.25	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Ind.Harbor,Ind. I-2	*3.40*	*3.30*	*3.35*	
Johnstown,Pa. B2	...	...	...	(16)3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.20	3.10	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bratonville,Ill.(19) K4	*5.35*
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown,Pa. B2	*5.35*
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	*5.45*
Minnequa,Colo. C10	5.55
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.20
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	*5.45*
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.20
Johnstown,Pa. B2	5.20
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	*4.20*
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.05
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	*4.65*
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.05

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	*4.40*
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.25
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	8.50
Lebanon,Pa. B2	8.50
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	8.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. Y1	5.35
Ind.Harbor,Ind. I-2	*5.35*
Kansas City, Mo. S5	5.60
Lebanon,Pa. B2	5.35
Minnequa,Colo. C10	5.35
Pittsburgh J5	5.35
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7	3.55
Williamsport,Pa. S19	3.55

Key to Producing Companies

M1	McLouth Steel Corp.
M4	Mahoning Valley Steel
M5	Medart Co.
M6	Mercer Tube & Mfg. Co.
M8	Mid-States Steel & Wire
M9	Midvale Co.
M10	Missouri-Illinois Furnace
M12	Moltrup Steel Products
M13	Monarch Steel Co.
M14	McInnes Steel Co.
N2	National Supply Co.
N3	National Tube Co.
N5	Nelsen Steel & Wire Co.
N6	New EngHighCarb.Wire
N8	Newman-Crosby Steel
N12	Niles Rolling Mill Co.
N14	Nrthwst. Steel Roll.Mills
N15	Northwestern S.&W. Co.
N16	New Delphos Mfg. Co.
O3	Oliver Iron & Steel Corp.
O4	Oregon Steel Mills
P1	Pacific States Steel Corp.
P2	Pacific Tube Co.
P4	Phoenix Iron & Steel Co.
P5	Pilgrim Drawn Steel
P6	Pittsburgh Coke & Chem.
P7	Pittsburgh Steel Co.
P9	Pittsburgh Tube Co.
P11	Pollak Steel Co.
P12	Portsmouth Steel Corp.
P13	Precision Drawn Steel
P14	Pitts. Screw & Bolt Co.
P15	Pittsburgh Metallurgical
P16	Page Steel & Wire Div., Amer. Chain & Cable
P17	Plymouth Steel Co.
R1	Reeves Steel & Mfg. Co.
R2	Republic Steel Corp.
R3	Rhode Island Steel Corp.
R5	Roebling's Sons, John A.
R7	Rotary Electric Steel Co.
R8	Reliance Div.,Eaton Mfg.
S1	Seneca Wire & Mfg. Co.
S3	Sharon Steel Corp.
S5	Sheffield Steel Corp.
S6	Shenango Furace Co.
S7	Simmons Co.
S8	Simonds Saw & Steel Co.
S9	Sloss-Sheffield S.&I. Co.
S13	Standard Forgings Corp.
S14	Standard Tube Co.
S15	Stanley Works
S7	Simmonds Co.
S16	Struthers Iron & Steel
S17	Superior Drawn Steel Co.
S18	Superior Steel Corp.
S19	Sweet's Steel Co.
T2	Tenn. Coal, Iron & R.R.
T3	Tenn. Prod.& Chem.
T4	Texas Steel Co.
T5	Thomas Steel Co.
T6	Thompson Wire Co.
T7	Timken Roller Bearing
T9	Tonawanda Iron Div. Am. Rad. & Stan. San.
U4	Universal Cyclops Steel
V2	Vanadium Alloys Steel
V3	Vulcan Crucible Steel Co.
W1	Wallace Barnes Co.
W2	Wallingford Steel Co.
W3	Washburn Wire Co.
W4	Washingon Steel Corp.
W6	Weirton Steel Corp.
W7	W. Va. Steel & Mfg. Co.
W8	Wstrn.Auto.Mach.Screw
W9	Wheatland Tube Co.
W10	Wheeling Steel Corp.
W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13	Wilson Steel & Wire Co.
W14	Wisconsin Steel Co.
W15	Woodward Iron Co.
W16	Worth Steel Co.
W18	Wyckoff Steel Co.
Y1	Youngstwn Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	on application
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

---

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base
(12) Worcester, Mass. Base.
(13) 3" & wider; over ½" to under 3" 5.50c.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(14) Also wide flange beams.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¼"x1¼" only.
(24) Deduct 0.35c for finer than 15 Ga.
(26) Reinforcing, mill shipments; to consumers, 4.83c; fabricated to fabricators, 4.58c.
(27) 22 Gage; hot or cold-reduced.
(28) Bonderized.

STANDARD PIPE, T. & C.

(Listed discounts are subject to revision, pending announcement of current changes being effected. Announcements issued to date indicate new discounts will be 2½ points lower.)

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	 B	 C	 Galvanized D	 E	 F
⅛	5.5c	0.24	39.0	37.0	36.0	11.0	9.0	8.0
¼	6.0	0.42	37.0	35.0	34.0	13.0	11.0	10.0
⅜	6.0	0.57	33.5	31.5	30.5	10.0	8.0	7.0
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.0	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	29.0	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Following make ½ through 3" only: Lorain, O. N3; Youngstown R2, Y1; Aliquippa, Pa. J5.

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1.

Column D: Etna, Pa. N2; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10. Following make ½" through 3" only: Lorain N3; Youngstown R2, Y1; Aliquippa, Pa. J5.

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	 Galv. B	 Elec. Weld Black C	 Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	 C.D.	Elec. Weld H.R.	 C.D.
1	13	12.36	14.39	13.00	13.00
1¼	13	14.63	17.05	13.21	15.39
1½	13	16.17	19.02	14.60	17.18
1¾	13	18.39	21.64	16.60	19.54
2	13	20.61	24.24	18.60	21.89
2¼	13	22.96	27.03	20.73	24.40
2¼	12	25.29	29.76	22.83	26.88
2½	12	27.71	32.58	25.02	29.41
2¾	12	29.36	34.53	26.51	31.18
3	12	30.82	36.27	27.82	32.74
3¼	11	35.87	42.22	32.39	38.11
3½	11	38.52	45.35	34.78	40.94
4	10	47.82	56.25	43.17	50.78
4½	9	63.37	74.59	....	....
5	9	73.37	86.32	....	....
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pacific Tube Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding	Plates Carbon Base 10%	 20%	Strip Cold-Rolled Carbon Base 10%	 Both Sides	Sheets Carbon Base 10%	 20%	 Copper Base Both Sides
Stainless							
302	....	....	....	....	19.75	21.50–	75.00
304	22.50	26.50	....	....	20.75	22.50–	77.00
305	....	....	....	....	....	....	79.00
309	27.00	31.00	....	....	....	....	....
310	32.50	36.50	....	....	....	....	105.00
316	27.00	31.00	....	....	26.00	28.00–	....
317	30.50	34.50	....	....	....	....	....
318	29.50	33.50	....	....	....	....	....
321	23.50	27.50	....	....	23.00	25.00	90.00
347	25.00	29.00	....	....	24.00	26.00–	94.00
405	18.75	24.75	....	....	....	....	....
410	18.25	24.25	....	....	....	....	....
430	18.25	24.25	....	....	....	....	....
Nickel	27.50	34.50	31.50	41.00	....	....	88.00
Inconel	36.00	46.00	....	....	....	....	115.00
Monel	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Deoxidized. † Deduct 4.25c for hot-rolled. Production for carbon base products are: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

(To consumers)

F.o.b. midwestern plants. Additional discounts on carriage, machine bolts, 5 for cl; 15 for full containers, except tire and plow bolts.

CARRIAGE, MACHINE BOLTS

(Per cent off list)

½-in., smaller; up to 6 in. long	35
$\frac{9}{16}$ & ⅝ x 6 in., shorter	37
¾-in. & larger x 6 in., shorter	34
All diameters longer than 6-in.	30
Tire bolts	25
Plow bolts	47
Lag bolts, 6 in., shorter	37
Lag bolts, longer than 6 in.	35

NUTS

Semifinished hexagon	A.S. Light	Reg. & Heavy
$\frac{7}{16}$-in., smaller	41 off	.....
½-in., smaller	....	38 off
½-in.-1-in.	39 off	.....
$\frac{9}{16}$-in.-1-in.	....	37 off
1⅛-in.-1½-in.	37 off	35 off
1⅝-in., larger	34 off	28 off

Additional discount of 15 for full containers.

STOVE BOLTS

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

SQUARE HEAD SET SCREWS

Upset 1-in. & smaller	51 off
¾, ⅞, & 1 x 6-in. & shorter	35 off
Headless, ¼-in., larger	31 off

HEXAGON CAP SCREWS

(Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	46 off
Upset (1035 heat treated) ⅝ and smaller x 6 and shorter	40 off

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger	6.75c
$\frac{7}{16}$-in., under	48 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	 Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34. Imported, net ton, duty paid, metallurgical grade, $39-$40.

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	37.50	30.50	28.50
302	37.50	33.00	28.50
303	39.50	36.50	31.00
304	39.50	35.00	30.00
309	52.00	52.00	41.50
316	53.00	55.00	46.00
321	45.50	44.50	34.00
347	50.00	48.50	38.50
410	33.00	27.00	23.00
416	33.50	33.50	23.50
420	40.50	43.50	28.50
430	35.50	27.50	23.50
501	24.00	22.50	11.50
502	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.

Baltimore, bars, wire and structurals A10.

Brackenridge, Pa., sheets A4

Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.

Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.

Detroit, strip, except Type 309 M1.

Dunkirk, N. Y., bars, wire A4.

Duquesne, Pa., bars C3.

Gary, Ind., sheets except Type 416 C3.

Harrison, N. J., strip C18.

Massillon, all products, except Type 309 bars, wire & cept Type 300 bars, wire & structurals quoted 42.00c, Type 501, 10.50c, Type 502 11.50c R2.

McKeesport, Pa., bars; sheets except Type 416, C3.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & 3trip C18.

Munhall, Pa., bars C3.

Pittsburgh, sheets C18.

Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.

So. Chicago, Ind., bars & structurals C3.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars U4.

Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.

Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c strip 60.00c W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4.

Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens	
Pure benzol	22.00
Toluol, one deg.	19.00-24.75
Industrial xylol	20.50-26.50
Per ton bulk, ovens	
Sulphate of ammonia	$45.00
Per pound, ovens	
Phenol, 40 (carlots, returnable drums)	13.25
Do., less than carlots	14.00
Do., tank cars	12.50

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron:	
98+% Fe, carlots	15.00
Swedish, c.i.f. New York, in bags	7.40-8.50
Electrolytic Iron:	
Annealed, 99.5% Fe	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns	65.00-130.00
Aluminum:	
Carlots, freight allowed	27.00
Atomized, 500-lb drums, freight allowed	30.00
Brass, 10-ton lots	23.25-26.25
Copper:	
Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese:	
Minus 100-mesh	52.00-55.00
Minus 35 mesh	48.00
Minus 200 mesh	56.00
Nickel, unannealed	61.00-66.00
Silicon	34.00-40.00
Solder (plus cost of metal)	8.50
Stainless Steel, 302	75.00
Tin	90.00-90.75
Zinc, 10-ton lots	15.50-18.25
	Dollars
Tungsten:	
99%, minus 80 to 200 mesh, freight allowed,	
1000 lb and over	2.90
500 to 1000 lb	2.95
less than 500 lb	3.05
98.8%, minus 65 mesh, freight allowed,	
1000 lb and over	2.90
less than 1000 lb	3.05
Molybdenum:	
99%, minus 80 to 200 mesh,	
over 500 lb	2.25
200 to 500 lb	2.50
less than 200 lb	2.75
82-88%, freight allowed,	
2000 lb and over	2.40
less than 2000 lb	2.45
Chromium, electrolytic, 99% Cr min.	3.50

METALLURGICAL COKE

Price per Net Ton

BEEHIVE OVENS

Connellsvll, fur.	$13.00-13.50
Connellsvll, fdry.	15.00-16.00
New River, foundry	18.00
Wise county, foundry	15.35
Wise county, furnace	14.60

OVEN FOUNDRY COKE

Kearny, N. J., ovens	$22.00
Everett, Mass., ovens New England, del.‡	22.70
Chicago, ovens	20.00
Chicago, del.	†21.45
Detroit, del.	23.91
Terre Haute, ovens	20.20
Milwaukee, ovens	20.75
Indianapolis, ovens	19.85
Chicago, del.	23.32
Cincinnati, del.	22.77
Detroit, del.	23.75
Ironton, O., ovens	19.40
Cincinnati, del.	21.63
Painesville, O., ovens	20.90
Buffalo, del.	23.02
Cleveland, del.	22.62
Erie, del.	21.04
Birmingham, ovens	17.70
Philadelphia, ovens	20.45
Swedeland, Pa., ovens	20.40
Portsmouth, O., ovens	19.50
Detroit, ovens	20.65
Detroit, del.	*21.70
Buffalo, del.	22.95
Flint, del.	23.00
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS				PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§	Standard Structural Shapes	Carbon	Floor
New York (city)	5.60	6.51	7.10	5.82	...	5.77	6.31	8.28	5.53	5.85	7.36
New York (c'try)	5.40	6.31	6.90	5.62	...	5.57	6.11	8.08	5.33	5.65	7.16
Boston (city) ..	5.75	6.75**	7.16	5.80	...	5.72	6.22	8.77	5.62	5.95	7.45
Boston (c'try) .	5.55	6.55**	6.96	5.60	...	5.52	6.02	8.57	5.42	5.75	7.25
Phila. (city)...	5.90	6.49	6.88	5.65	...	5.65	6.21	8.10	5.35	5.60	6.80
Phila. (c'try)..	5.65	6.24	6.63	5.40	...	5.40	5.96	7.85	5.10	5.35	6.55
Balt. (city) ...	5,46	6.36	6.81	5.52	...	5.57	6.05	...	5.51	5.71	7.16
Balt. (c'try) ..	5.31	6.21	6.66	5.37	...	5.42	5.91	...	5.36	5.56	7.01
Norfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	6.07‡	...	...	5.83	...	5.88	6.62	...	5.82	6.02	7.47
Buffalo (del.)..	5.00‡	5.90	7.57	5.39	6.42	5.10	5.60	10.13	5.15	5.50	7.06
Buffalo (w'hse)	4.85‡	5.75	7.42	5.24	6.27	4.95	5.40	9.60	5.00	5.35	6.91
Pitts. (w'hse)..	4.85	5.75[4]*	6.80	5.00	6.00	4.90	5.40	9.20††	4.90	5.05	6.55
Detroit (w'hse).	5.32	6.22[4]*	7.35	5.42	6.42-6.73	5.48	5.90	8.44-8.59	5.48	5.67	7.02
Cleveland (del.)	5.25	6.00	6.70	5.44	6.15	5.32	5.60	7.84-8.00	5.37	5.52	6.87
Cleve. (w'hse) .	5.05	5.80	6.55	5.24	6.00	5.12	5.45	7.84-7.85	5.17	5.32	6.67
Cincin. (w'hse).	5.27‡	5.94**	6.83	5.39	6.10	5.44	5.95	...	5.44	5.64	7.05
Chicago (city)..	5.05	5.95[4]	7.05	5.05	6.35-6.85	5.10	5.60	7.90[5]	5.10	5.30	6.75
Chicago (w'hse)	4.85	5.75[4]	6.85	4.85	6.15-6.65	4.90	5.40	7.70[5]	4.90	5.10	6.55
Milwaukee (city)	5.18	6.08[4]	7.18	5.18	6.48-6.98	5.23	5.78	8.03[5]	5.23	5.43	6.88
Milwau. (c'try).	5.03	5.93[4]	7.03	5.03	6.33-6.83	5.08	5.63	7.88[5]	5.08	5.28	6.73
St. Louis (del.)	5.37	6.27[4]	7.44	5.34	6.64	5.39	6.19[6]	6.64	5.39	5.59	7.04
St. L. (w'hse).	5.22	6.12[4]	7.29	5.19	6.49	5.24	6.04[6]	6.49	5.24	5.44	6.89
Birm'ham (city)	5.00	5.90	6.55	5.00	...	5.05	6.59	...	5.05	5.25	7.74
Birm'ham (c'try)	4.85	5.75	6.40	4.85	...	4.90	...	...	4.90	5.10	...
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.65	7.90
L. A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
San Francisco..	6.15[10]	7.50[3]	7.80	6.75[10]	8.25[3]	5.90[10]	7.55	10.85[2]	5.90	6.35	8.10
Seattle-Tacoma.	6.70[7]‡	8.15[3]	8.80	6.70[7]	...	6.20[7]	8.15[1]	10.10	6.00[7]	6.35[7]	8.40[7]

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; ** 17 gage; †† as annealed. Base quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; galvanized sheets, 450 lb to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—1500 to 1999 lb; [9]—400 to 3999 lb; [10]—400 lb and over; [11]—500 to 1499 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $107. Hard-fired, $141 at above points.

High-heat Duty: Salina, Pa. $85; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $86.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $80.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., Ottawa, Ill., $72.

LADLE BRICK

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa., Chester, New Cumberland, W. Va., Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., Ottawa, Ill., $96; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Eastern Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates, contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
Brazil iron ore, 68-69%	18.50

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid. 81.8c-83.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African	
48% 2.8:1	$35.00
48% 3:1	37.50
48% no ratio	28.50-29.00
South African Transvaal	
44% no ratio	$19.00-20.00
45% no ratio	19.50-21.00
48% no ratio	27.00-28.00
50% no ratio	28.50-29.00
Brazilian	
44% 2.5:1 lump	$32.00
Rhodesian	
45% no ratio	$20.00-21.00
48% no ratio	28.00-29.00
48% 3:1 lump	37.50
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolitic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(*Please turn to page* 362)

Steel Mills in Market for Zinc

Revival of purchasing activity attributed to removal of uncertainty as to steel industry's price structure and to belief demand for steel products will continue strong

New York—The zinc market has been marked with renewal of heavy buying by steel mills. This activity is attributed to removal of uncertainty as to the steel industry's price structure and to expectation that demand for steel products will continue strong. Galvanized steel products have been in tight supply-demand position for some months.

Increased demand is also reported for ordinary high-grade and special high-grade zinc. Supply of the latter continues tight with the Palmerton, Pa., smelter of the New Jersey Zinc Co. closed by a strike since Oct. 1.

Purchase of 10,000 tons of prime western grade zinc for delivery over the first three months of 1950 has been made by the British Ministry of Supply. The metal is of Mexican origin and will be priced on the basis of the average U. S. quotation at East St. Louis for the month in which delivery is made. The British Ministry also is seeking 2000 tons of ordinary high-grade zinc and 4000 tons of special high-grade zinc for first quarter 1950 shipment.

Copper—One important domestic copper producer reports a sold-out position for January. Its February supplies of copper for sale may have to be limited mostly to current refined production inasmuch as excess stocks have been eliminated.

As a result of the pickup in demand for copper Kennecott Copper Corp. has resumed six-day work weeks. It had been on a reduced week of five days since about mid-1949 following the severe spring slump in demand and a sharp drop in price. Other domestic producers recently returned to the six-day work week.

Brass — Moderate improvement made in deliveries of brass ingots since mid-1949 was maintained in November. While shipments of 18,488 tons that month failed to show a further good gain over the preceding month they were, nevertheless, the second best of the year. The year's aggregate of shipments, however, were about 100,000 tons behind 1948 and were making 1949 the poorest on record since 1940. Shipments for the first 11 months of 1949 totaled 157,683 tons, compared with 258,546 tons for the like period of 1948. December ingot shipments were expected to show some decline. Near the close of December there were reports of price cutting on 85-5-5-5 ingots despite very firm prices for and a scarcity of ingot making scrap. Some business was said to have been done at prices a cent a pound below lowest published prices.

Lead—Demand for lead shows an increase over the relatively small volume of recent weeks. Sales are reported to be in sufficient volume to absorb the daily production of mine producers as well as the custom smelter day-to-day intake of ore and scrap. The Selby, Calif., lead refinery and smelter of American Smelting & Refining Co. continues closed by a strike. Other large lead plants of the company remain in operation.

Shipments of 37,779 tons of refined lead to domestic consumers during November represented an increase of 14,000 tons over October and marked the largest movement since February. The November tonnage brought the total for the first 11 months of 1949 to 349,048 tons. This was 129,500 tons less than the total shipped in the comparable period of 1948. Shipments to all consuming lines showed gains in November. Largest increase was in shipments to "unclassified" consumers. Next largest increase was to cable makers.

Production of refined lead in November rose about 2000 tons to 49,223 tons, bringing the total for the first 11 months of 1949 to 508,547 tons, or about 15,600 tons greater than the corresponding period of 1948.

Stocks of refined lead at refineries at the end of November showed little change at 65,954 tons, compared with 66,005 tons at the close of October.

The domestic market is quiet with prices unchanged on the basis of 11.80c, St. Louis.

Antimony—Any improvement in the dull market for antimony depends largely on a pickup in the battery industry, and this is still not in sight, says one large producer of batteries. Sales have been confined primarily to ton lots. Carload orders are few as a result of consumers' cautious buying policy stemming from the erratic price structure and the drop in business in antimonial-lead consuming lines.

Tin—World mine production of tin in October totaled 13,400 tons, compared with 13,200 tons in September, according to advance figures from the International Tin Study Group, The Hague. World tin production in the first ten months of 1949 rose to 133,000 tons against the 124,400 tons in the corresponding period of 1948.

The downtrend in tin prices apparently has been halted with Straits spot still available at 78.00c New York.

Reynolds Buys Aluminum Plants

Washington—Sale of four aluminum plants and facilities and a sinter plant to Reynolds Aluminum Co., wholly owned subsidiary of Reynolds Metals Co., Louisville, for $50,081,958 was announced by General Services Administrator Jess Larson.

Reynolds has been operating the plants—built by the government during the war—under lease with options to buy since 1946.

Properties included in the sale are: An alumina plant at Hurricane Creek, Ark.; aluminum reduction plants at Jones Mills, Ark., and Troutdale, Oreg.; an aluminum sheet and rolling mill at McCook, Ill.; and a sinter plant used with the Hurricane Creek alumina plant.

Original cost of the plant to the government was $130 million.

Mr. Larson said: "The alumina and aluminum plants leased to Permanente Metals Corp. and sold to that corporation on July 29, 1949, firmly established Permanente as an independent operator in the aluminum industry.

"Now the sale of similar plants to Reynolds has been effected. These two producers have developed substantially in the past four years so that, through the use of plants principally acquired from the government, they are producing today in excess of 50 per cent of the basic virgin aluminum pig and ingot produced in the United States.

"Ownership places them in a stronger and more competitive position. It is consistent with the policy of getting the government out of business as quickly as possible."

Castings Shipments Hold Up

Washington—Shipments of nonferrous castings in October amounted to 125.8 million pounds, compared with 126.0 million pounds in September, the U. S. Bureau of Census reports.

The October total consists of 58.2 million pounds of copper castings, 29.1 million pounds of aluminum castings, 36.4 million pounds of zinc castings, 0.8 million pounds of magnesium castings and 1.3 million pounds of lead die castings.

Shipments of copper and lead castings were below the September level, while all the others were at a higher level.

At the end of October, unfilled orders for these nonferrous castings amounted to 102.7 million pounds, about 2 per cent below September.

"Push Button" Mining for Gold

San Francisco—A "push button" operation to mine low grade alluvial ore on a large scale for gold is getting underway in Nye county, Nevada.

The operation, described as 100 per cent mechanical, is being pioneered by Yuba Consolidated Gold Fields Inc., San Francisco, and the Fresnillo Co., an affiliate of Consolidated Gold Fields of South Africa. The two companies have spent about $2.5 million in the venture through a jointly owned subsidiary, the Round Mountain Gold Dredging Co.

Low grade ore will be dug from the open pit on Round mountain by electric power shovels and will be dumped onto a conveyor belt and transported on a 3000-foot conveyor belt to a mill. When in full production, the mill is expected to be capable of handling 17,000 tons a day.

The sponsors expect the ore to yield a minimum of 20 cents a ton, enabling them to gross $3400 daily at full production. Round mountain reserves of low grade ore are estimated to be sufficient for 15 years' operations.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.

Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.25c, East St. Louis; high grade 10.75-10.85c, delivered.

Lead: Common, 11.80c; chemical, 11.90c; corroding, 11.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 16.25-16.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00-18.25c; grade 2, 17.50-17.75c; grade 3, 16.00-16.25c; grade 4, 15.50-15.75c. Prices include freight at carload rate up to 75 cents per 100 lb.

5% titanium-aluminum alloy No. 1 (low Cu) 31.00c; No. 2 (2% Cu) 28.00c, f.o.b. Eddystone, Pa.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt delivery, 78.00c; January arrival, 77.00c; February arrival, 75.50c; March arrival, 75.00c. Chinese, 99% tin, prompt del., nom.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 78.00c.

Antimony: American 99-99.8% and over but not meeting specifications below, 32.00c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 32.50c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99% (Chinese, English, Belgium), prompt, 26.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-$72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95% 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

---

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.00 per cwt. Traps and bends: List price plus 45%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon znic in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Dec. 19-29	18.50	11.80	9.75	78.00	17.00	32.00	40.00	73.25
Dec. 16-17	18.50	11.80	9.75	78.25	17.00	32.00	40.00	73.25
Dec. 14-15	18.50	11.80	9.75	78.75	17.00	32.00	40.00	73.25
Dec. 8-13	18.50	11.80	9.75	79.00	17.00	32.00	40.00	73.25
Dec. 5-7	18.50	11.80	9.75	80.75-81.00	17.00	32.00	40.00	73.25
Dec. 2-3	18.50	11.80	9.75	81.00	17.00	32.00	40.00	73.25
Dec. 1	18.50	11.80	9.75	83.00	17.00	32.00	40.00	73.25
Nov. Avg.	18.427	12.348	9.760	89.823	17.00	32.00	40.00	73.25
Nov. 30	18.50	11.80	9.75	83.25	17.00	32.00	40.00	73.25
Nov. 28-29	18.50	11.80	9.75	84.75	17.00	32.00	40.00	73.25
Nov. 21-26	18.50	11.80	9.75	85.00	17.00	32.00	40.00	73.25
Nov. 18-19	18.50	12.30	9.75	85.50	17.00	32.00	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials .

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c: oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbls, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 94.00c, 500 to 999 lb, 94.50c; 200 to 499 lb, 95.00c; less than 200 lb, 96.50c; ball, 1000 lb and over, 96.25c; 500 to 999 lb, 96.75c; 200 to 499 lb 97.25c; less than 200 lb, 98.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 59.7c; 100 or 300 lb drums only, 100 to 500 lb, 51.4c; 600 to 1900 lb, 49.0c; 2000 to 9900 lb, 47.3c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 86.20c; more than 2000 lb, 84.20c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 72.59c; 100 lb kegs 73.59c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%..	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze ..	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.75; composition red brass 12.50-12.75; radiators 10.00; heavy yellow brass 9.50-9.75.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; refinery brass (60% copper) per dry copper content 13.50.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire, No. 1 13.50-13.75, No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 6.75-7.00; new brass rod ends 9.75-10.00, auto radiators, unsweated 8.00-8.25; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.

Lead: Heavy 9.25-9.50, battery plates 4.50; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.25-9.50.

Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.

Tin: No. 1 pewter 42.00-42.50; block tin pipe 63.00-63.50, No. 1 babbitt 30.00-30.50.

Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Dec. 29, 1949; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Dec. 29	$26.92
Dec. 22	27.25
Dec. 1949	28.96
Dec. 1948	43.25
Dec. 1944	18.95

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$30.00
No. 2 Heavy Melt.	27.00-28.00
No. 1 Busheling	30.00
No. 1 Bundles	30.00
No. 2 Bundles	25.00-26.00*
No. 3 Bundles	23.00-24.00*
Heavy Turnings	23.50-24.50
Machine Shop Turnings	21.00-22.00†
Mixed Borings, Turnings	22.00-23.00†
Short Shovel Turnings.	25.00-26.00
Cast Iron Borings	22.50-23.00
Low Phos. Steel	34.50-35.50

Cast Iron Grades*

No. 1 Cupola Cast	35.00-36.00
No. 1 Machinery Cast.	39.00-40.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast.	27.00-28.00

Railroad Scrap*

No. 1 R.R. Heavy Melt.	33.50-34.00
Axles	36.00-37.00
Rails, Random Length.	36.00-37.00
Rails, 2 ft. and under.	40.00-41.00
Rails, 18 in. and under	41.00-42.00
Railroad Specialties	36.00-37.00
Angles, Splice Bars	34.00-34.50

---

* Nominal.

† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	*$27.00-27.50*
No. 2 Heavy Melt. Steel	*24.50-25.00*
No. 1 Busheling	*27.00-27.50*
No. 1 Bundles	*27.00-27.50*
No. 2 Bundles	*22.50*
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.50-20.00
Short Shovel Turnings.	19.50-20.00
Cast Iron Borings	19.50-20.00
Bar Crops and Plate	*29.00-29.50*
Punchings & Plate Scrap	*30.50-31.00*
Cut Structurals	*30.00-30.50*

Cast Iron Grades

No. 1 Cupola	*42.50-43.50*
Charging Box Cast	*36.50-37.50*
Stove Plate	*35.50-36.50*
Heavy Breakable Cast	*33.50-34.50*
Unstripped Motor Blocks	*31.00-32.00*
Brake Shoes	*28.50-29.50*
Clean Auto Cast	*43.50-44.50*
No. 1 Wheels	*37.50-38.50*
Burnt Cast	*31.50-32.50*

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	43.00-44.00
Rails, 18 in. and under	44.00-45.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	40.00-41.00

VALLEY

No. 1 Heavy Melt. Steel	*$30.00-30.50*
No. 2 Heavy Melt. Steel	*28.00-29.00*
No. 1 Bundles	*30.00-30.50*
No. 2 Bundles	*23.50-24.50*
Machine Shop Turnings	*20.50-22.50*
Short Shovel Turnings	*22.50-23.00*
Cast Iron Borings	*21.50-22.00*
Low Phos.	31.50-32.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$23.50-24.00**
No. 2 Heavy Melt. Steel	*22.00-23.00**
No. 1 Busheling	*22.00-23.00**
No. 1 Bundles	*23.50-24.00**
No. 2 Bundles	*19.50**
Machine Shop Turnings	16.50-17.50
Short Shovel Turnings.	18.50
Mixed Borings, Turnings	*14.50-15.50*
Bar Crop and Plate	*25.50-26.50*
Punchings & Plate Scrap	*25.50-26.50*
Cut Structurals	*25.00-26.00*
Elec. Furnace Bundles	*25.00*
Heavy Turnings	*24.00*
No. 1 Chemical Borings	*29.00*

Cast Iron Grades

No. 1 Cupola Cast	*33.00-34.00*
No. 1 Machinery Cast	*36.00-37.00*
Charging Box Cast	*34.00-35.00*
Heavy Breakable Cast	*34.00-35.00*
Unstripped Motor Blocks	*29.00-30.00*
Clean Auto Cast	37.00
No. 1 Wheels	*37.00-38.00*
Malleable	39.00

---

* Nominal.

CINCINNATI

No. 1 Heavy Melt. Steel	$27.00
No. 2 Heavy Melt. Steel	25.00
No. 1 Busheling	26.00
No. 1 Bundles	27.00
No. 2 Bundles	20.00
Machine Shop Turnings	14.00
Short Shovel Turnings.	17.00
Mixed Borings, Turnings	17.00
Cast Iron Boring	17.00

Cast Iron Grades

No. 1 Cupola Cast	40.00
Charging Box Cast	32.00
Heavy Breakable Cast.	34.00
Stove Plate	30.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	40.00
Drop Broken Cast	43.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	32.00
Rails, Rerolling	36.00
Rails, Random Length.	34.00
Rails, 18 in. and under	43.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$23.00-24.00
No. 1 Bundles	27.00-28.00
No. 2 Bundles	23.00-24.00
No. 1 Busheling	27.00-28.00
Machine Shop Turnings	16.00-17.00
Mixed Borings, Turnings	16.00-17.00
Short Shovel Turnings.	18.00-19.00
Cast Iron Borings	18.00-19.00
Punchings & Plate Scrap	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Heavy Breakable Cast.	31.00-32.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$29.50-30.00
No. 2 Heavy Melt. Steel	27.50-28.00
No. 1 Bushelings	27.50-28.00
No. 1 Bundles	28.50-29.00
No. 2 Bundles	25.50-26.00
Machine Shop Turnings	20.00-20.50
Mixed Borings, Turnings	21.00-21.50
Cast Iron Borings	21.00-21.50
Short Shovelings	22.50-23.00
Low Phos.	31.50-32.00

Cast Iron Grades

No. 1 Machinery	39.50-40.00
No. 1 Cupola	36.00-37.00
Malleable	34.50-35.00

Railroad Scrap

Rails, 2 ft. and under.	38.00-39.00
Scrap rails	35.00-36.00
Specialties	35.00-36.00
No. 1 car wheels	36.00-37.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point

No. 1 Heavy Melt. Steel	*$20.50*
No. 2 Heavy Melt. Steel	*18.00-18.50*
No. 1 Busheling	*18.00-18.50*
No. 1 Bundles	*20.50*
No. 2 Bundles	17.00-18.00
Machine Shop Turnings	11.00-12.00
Mixed Borings, Turnings	11.00-12.00
Short Shovel Turnings.	11.00-12.00
Punchings & Plate Scrap	*20.00-21.00*
Cut Structurals	*20.00-21.00*
Elec. Furnace Bundles	*20.00-21.00*

Cast Iron Grades

No. 1 Cupola Cast	*26.00-27.00*
No. 1 Machinery	*29.00-30.00*
Charging Box Cast	*22.00-23.00*
Heavy Breakable	*22.00-23.00*
Unstripped Motor Blocks	*23.00*
Malleable	36.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$19.50-20.00*
No. 2 Heavy Melt. Steel	*16.50-17.00*
No. 1 Bundles	*19.50-20.00*
No. 1 Busheling	*17.00-17.50*
Machine Shop Turnings	*11.00-11.50*
Mixed Borings, Turnings	*11.00-11.50*
Short Shovel Turnings	*13.00-14.00*
Bar Crops and Plate	*21.50-22.00*
Punchings & Plate Scrap	*21.50-22.00*
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	*29.50-32.50*
Mixed Cast	*25.50-26.50*
Heavy Breakable Cast	*26.50-27.50*
Stove Plate	*23.50-24.50*
Unstripped Motor Blocks	*19.50-20.50*

CHICAGO

No. 1 Heavy Melt. Steel	$26.00-28.00
No. 2 Heavy Melt. Steel	24.00-25.00
No. 1 Bundles	26.00-28.00
No. 2 Bundles	22.00-23.00
Machine Shop Turnings	*16.00-17.00*
Mixed Borings, Turnings	*16.00-17.00*
Short Shovel Turnings.	19.50-20.50
Cast Iron Borings	*16.00-17.00*
Bar Crops and Plate	*29.00-30.00*
Punchings	*29.00-30.00*
Elec. Furnace Bundles.	28.00-29.00
Heavy Turnings	23.00-24.00
Cut Structurals	29.00-30.00

Cast Iron Grades

No. 1 Cupola Cast	*38.00-39.00*
Clean Auto Cast	*39.00-40.00*
No. 1 Wheels	32.00-33.00
Stove Plate	32.00-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50-29.50
Malleable	37.00-38.00
Rails, Rerolling	*41.00-42.00*
Rails, Random Lengths	36.00-37.00
Rails, 2 ft. and under	*39.00-40.00*
Rails, 18 in. and under	*40.00-41.00*
Railroad Specialties	*30.00-31.00*
Angles, Splice Bars	*34.00-35.00*

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings.	19.00
Cast Iron Borings	18.00
Bar Crops and Plate..	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R. R. Malleable	nominal
Rails, Rerolling	37.00
Rails, 3 ft. and under.	25.00-26.00
Angles and Splice Bars	31.00-33.00

ST. LOUIS

No. 1 Heavy Melt. Steel	*$30.50-31.50*
No. 2 Heavy Melt. Steel	26.00-27.00
Machine Shop Turnings	16.00-18.00
Short Shovel Turnings	20.00-21.00

Cast Iron Grades

No. 1 Cupola Cast	36.00-37.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast.	28.00-29.00
Brake Shoes	30.00-31.00
Clean Auto Cast	38.00-39.00
Burnt Cast	30.00-31.00

Railroad Scrap

R.R. Malleable	29.00-30.00
Rails, Rerolling	*38.00-39.00*
Rails, Random Lengths	32.00-33.00
Rails, 3 ft. and under	37.00-38.00
Uncut Tires	*26.00-29.00*
Angles, Splice Bars	*34.00-35.00*
Railroad Specialties	31.00-32.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Wheels	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	22.00
Cut Structurals	22.00
Elec. Furnace Bundles.	23.00

Cast Iron Grades

No. 1 Cupola Cast	25.00
Heavy Breakable Cast.	20.00
Stove Plate	20.00
Unstripped Motor Blocks	18.00
Malleable	20.00
Brake Shoes	18.00
Clean Auto Cast	25.00
No. 1 Wheels	25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.00
Punchings & Plate Scrap	24.00
Elec. Furnace Bundles.	25.00

Cast Iron Grades

No. 1 Cupola Cast	28.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings..	18.00

Cast Iron Grades*

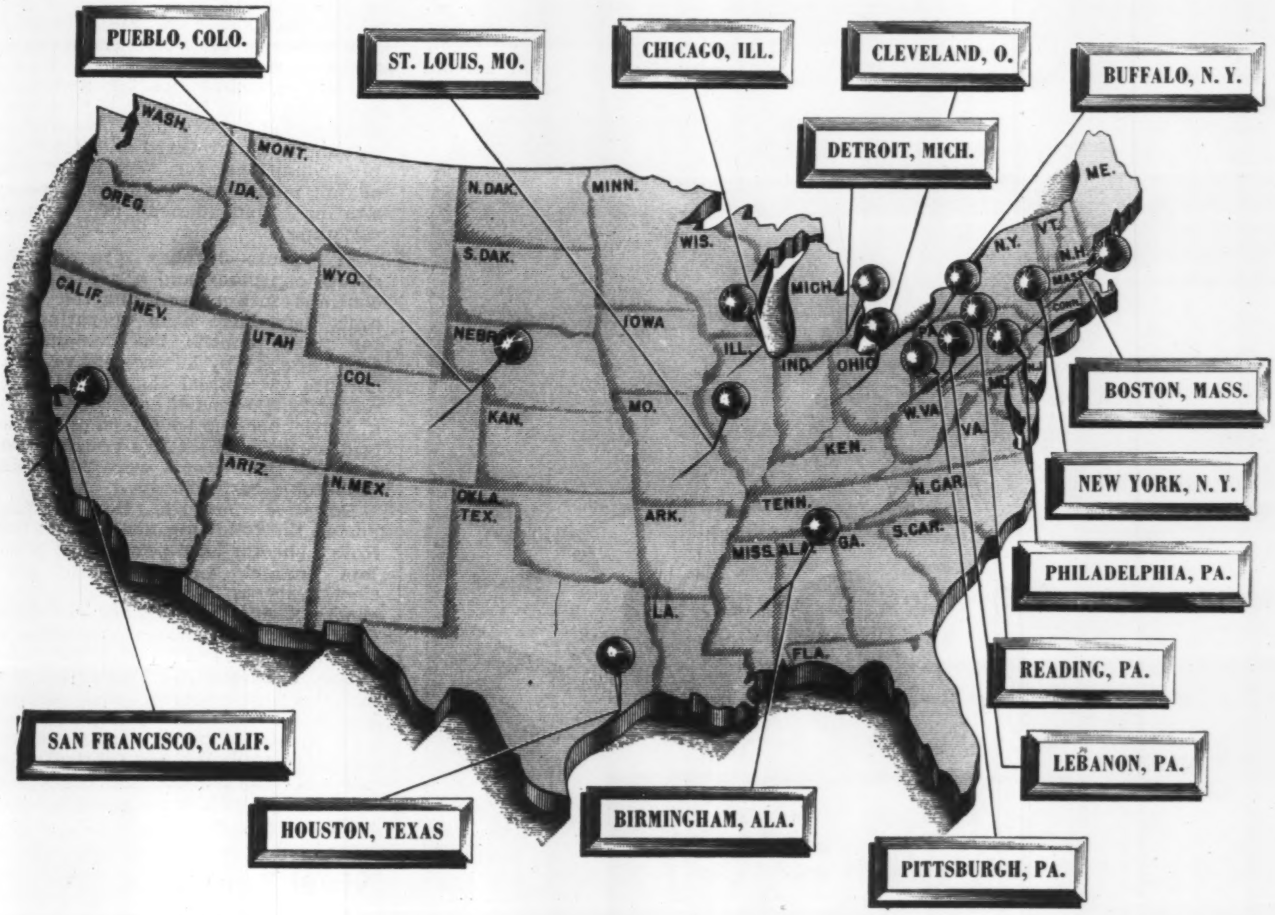
Cast	40.00-43.00

---

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

For the Purchase or Sale of Iron and Steel Scrap . . .

CONSULT OUR NEAREST OFFICE


PUEBLO, COLO.
ST. LOUIS, MO.
CHICAGO, ILL.
CLEVELAND, O.
BUFFALO, N. Y.
DETROIT, MICH.
BOSTON, MASS.
NEW YORK, N. Y.
PHILADELPHIA, PA.
READING, PA.
LEBANON, PA.
PITTSBURGH, PA.
BIRMINGHAM, ALA.
HOUSTON, TEXAS
SAN FRANCISCO, CALIF.
WASH.
MONT.
OREG.
IDA.
N.DAK.
MINN.
S.DAK.
WIS.
WYO.
CALIF.
NEV.
UTAH
NEBR.
IOWA
MICH.
ILL.
IND.
OHIO
PA.
N.Y.
VT.
N.H.
ME.
MASS.
CONN.
COL.
KAN.
MO.
W.VA.
VA.
MD.
ARIZ.
N.MEX.
OKLA.
TEX.
ARK.
KEN.
TENN.
N.CAR.
S.CAR.
MISS.
ALA.
GA.
LA.
FLA.

The energy and integrity of our organization is ready to serve your best interests . . .
Since 1889, Luria Brothers & Company, Inc. have made fair dealings their constant aim.

CONSULT OUR NEAREST OFFICE FOR THE PURCHASE AND SALE OF SCRAP

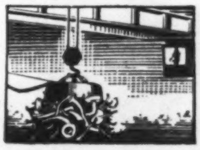
LURIA BROTHERS AND COMPANY, INC.

Main Office

LINCOLN-LIBERTY BLDG.
Philadelphia 7, Pennsylvania

Yards

LEBANON, PA. • READING, PA.
DETROIT (ECORSE), MICH.
MODENA, PA. • PITTSBURGH, PA.
ERIE, PA.



Branch Offices

BIRMINGHAM, ALA.
Empire Bldg.

BOSTON, MASS.
Statler Bldg.

BUFFALO, N.Y.
Genesee Bldg.

CHICAGO, ILL.
100 W. Monroe St.

CLEVELAND, O.
1022 Midland Bldg.

DETROIT, MICH.
2011 Book Bldg.

HOUSTON, TEXAS
803-4-5 Milam Bldg.

LEBANON, PA.
Luria Bldg.

NEW YORK, N.Y.
Woolworth Bldg.

PITTSBURGH, PA.
Oliver Bldg.

PUEBLO, COLO.
334 Colorado Bldg.

READING, PA.
Luria Bldg.

ST. LOUIS, MO.
2110 Railway Exchange Bldg.

SAN FRANCISCO, CAL.
Pacific Gas & Elec. Co., Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Sheets Strip . . .

Sheet and Strip Prices, Page 347 & 348 & 349

Chicago—Buyers of some specialty items, such as tin mill products and electrical sheets, will have to wait for answers to some of their cost problems. Inland Steel, for example, which last Tuesday put into effect new base prices does not have extra booklets prepared on all products as yet. Indications are it will be some time until representatives of the mills know all the answers to questions arising out of the new schedules. While direct comparison of the amount of increase in electrical sheets is difficult because of the change in pricing setup, it is noted Inland's advance is smaller than that effected by some other sellers. Other items in the company's list conform generally with the new prices of other mills.

Boston—Consumers of carbon flat-rolled products are paying an average of $5 to $6 per ton more for sheets. In the case of cold-rolled strip some sizes and grades are up a like amount because of the upward revision in extras.

Nonintegrated producers of cold-rolled strip are falling in line with the new extra charges, passing along their increased costs to users.

Substantial volume of electrical grades of silicon sheets and strip on mill books for delivery this quarter will take a stiff price increase, up to $25 per ton and more including extras.

The advance in prices has had slight effect on pressure for flat-rolled to date. Carbon sheet mill schedules are filled through first quarter; well beyond in those instances where sellers have been willing to book further ahead.

Cleveland—Buyers of flat-rolled products are examining new price schedules and extra cards to determine their new cost position. Whether the higher prices will kill off some potential demand is a question only time will determine. Buyers are expected to exert greater prudence in ordering new tonnage, loosening up on their specifications wherever possible so as to hold overall costs down.

Meanwhile, the new year opens on a strong note. The mills are booked up through first quarter and could book additional tonnage if they were so disposed. Consumer pressure for shipments is unrelaxed and tight supply conditions for the next three or four months are in prospect, necessitating continuance of informal rationing.

St. Louis—Intense pressure for sheets continues and allocations will continue into second quarter. Cold mills here have been operating full for many months, but demand still tops capacity by 50 per cent or more. Granite City Steel Co. turned out a record 22,000 tons of cold-rolled sheets in November and 8000 tons of galvanized sheets. The mill's previous records for these items were 20,000 and 7500 tons, respectively.

Effective Jan. 1, the company posted the following new prices: Cold Rolled sheets, 4.30c per pound; porcelain enamel, 4.60c; electric grade electric sheets, 7.15c; and motor grade sheets, 8.15c. Roofing, one of Granite City Steel's big items, continues on a commodity basis.

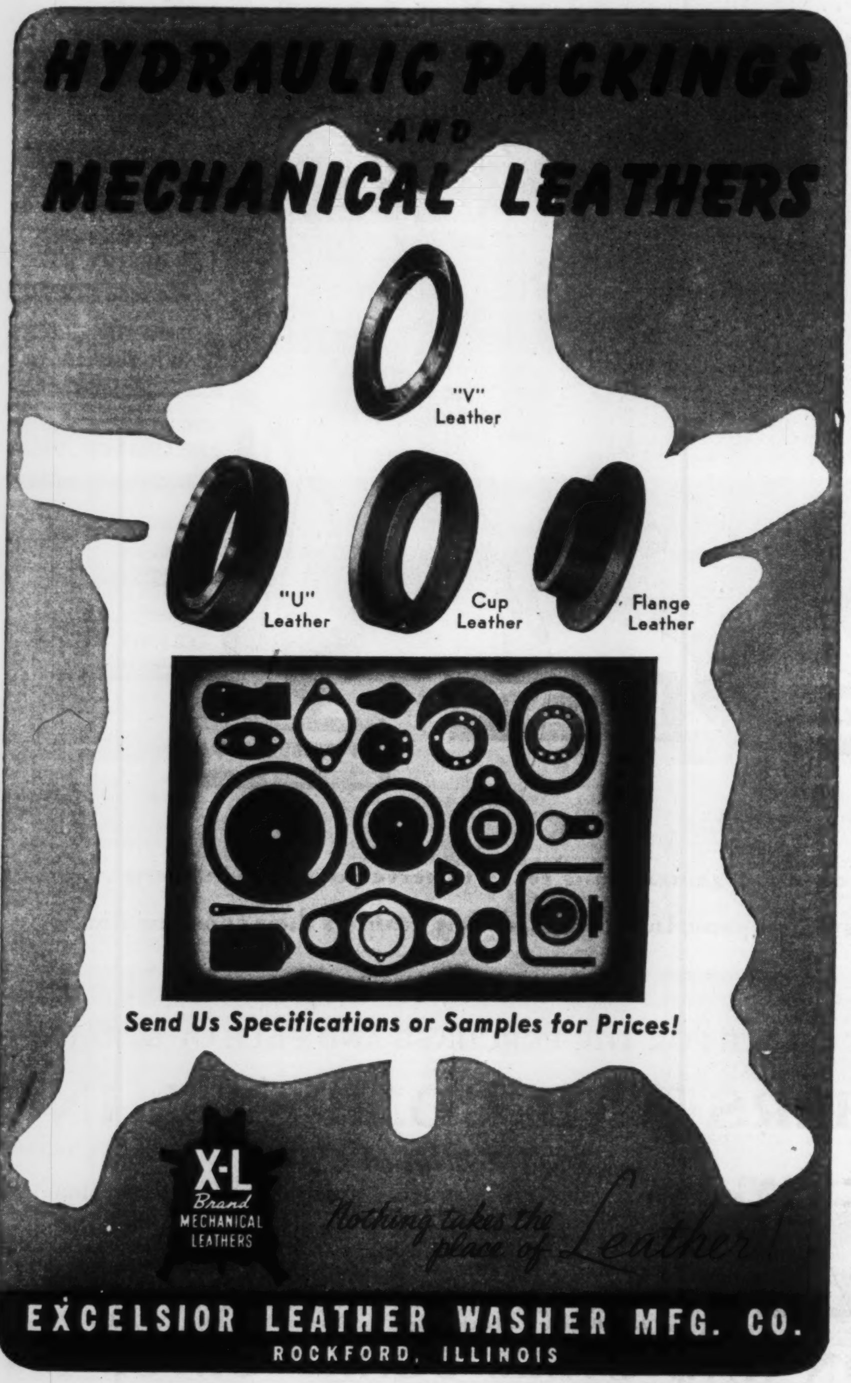
San Francisco — Flat-rolled steel supplies are scarce, and demand shows no signs of easing. Galvanized sheets probably are in shortest supply. Although no fabricator reports serious trouble, shortages seem certain to pinch some manufacturers within a few weeks.

Steel Bars . . .

Bar Prices, Page 347

Pittsburgh—Cold-finished bar producers have increased base prices $3 per ton on carbon grades. No action has yet been taken on alloy. The upward price adjustment reflects recent advance of $2 per ton in base price of hot-rolled carbon bars and other increased cost of materials and services. Coldfinishers also have revised extra cards in line with upward adjustments initiated by hot-rolled interests. The new extra cards will take into consideration the advance of $2 per ton on special bar quality hot-rolled extra; advance of $1 to $2 in sulphur and manganese extras and general revision in hot-rolled bar size extras which range up to $12 per ton.

Cleveland—While bar mill order backlogs are substantial tonnage is available for first quarter shipment. Indications are competitive conditions will be restored in this market much sooner than in the case of sheets and strip. Virtually all sellers now are on the higher price level initiated in


HYDRAULIC PACKINGS
AND
MECHANICAL LEATHERS
"V" Leather
"U" Leather
Cup Leather
Flange Leather
Send Us Specifications or Samples for Prices!
X-L Brand MECHANICAL LEATHERS
Nothing takes the place of Leather!
EXCELSIOR LEATHER WASHER MFG. CO.
ROCKFORD, ILLINOIS

mid-December by subsidiaries of the U. S. Steel Corp. Extra cards, however, have not yet been received from all interests so that it is still impossible for consumers to determine if the pattern of the leading producing interest was departed from to any extent.

Chicago—The local situation in the cold-finished bar market is somewhat foggy. No producer has taken the initiative here in revising cold-drawn quotations. Privately several indicate changes are in order and in view of higher hot bar costs seem inevitable. Demand for cold-drawn bars has been relatively steady, but not lively enough, in the opinion of some trade authorities, to prevent some loss in business if changes are not market-wide.

San Francisco—Bars are fairly plentiful, and producers are competing strongly for business. Consumers generally show a tendency to buy only for immediate needs.

Wire . . .

Wire Prices, Page 349

Boston—The increase of $9 per ton on carbon rods leaves a spread of $2 on manufacturers bright low carbon wire. This spread has narrowed steadily over a period of years, accompanied by similar trend in other grades.

Demand for wire is well diversified and steady. Carryovers this quarter include a fair volume of cold heading wire with most producers.

Structural Shapes . . .

Structural Shape Prices, Page 347

Boston—Somewhat firmer range of fabricated structural prices is developing from advances in standard shapes from $3.50 to $4.50 a ton, including extras. Substantial volume of bridge work is up for estimates and bids are in on 2600 tons for Sullivan Square, Boston, construction. Contracts have been placed for 510 tons, bridges, Connecticut, with about 325 tons to be placed in that state.

Philadelphia — Structural activity shows little promise of improvement before the new month is over with public work dominating. Fabricators' backlogs are likely to undergo further decline before an upturn sets in.

San Francisco — Seasonal lulls, along with low level private construction, worry producers of structural material. They point out building of hotels, apartment houses and office buildings hasn't kept pace with the influx of population to the West Coast. High labor costs are an important factor holding back this type of construction. Some signs have appeared recently that building may pick up in the spring.

Seattle—Several large structural jobs are pending. Eastern fabricators are offering increased competition in this area. Plant operations are down and little activity is expected before February. Demand for small tonnages is at low ebb.

Reinforcing Bars . . .

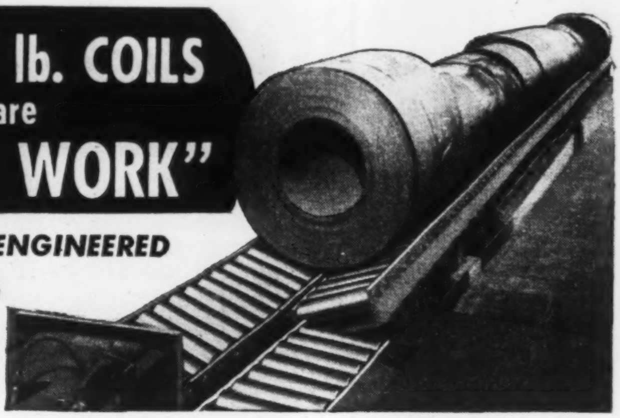
Reinforcing Bar Prices, Page 347

Pittsburgh—In addition to the $2 per ton increase in base price for mill material, size extras have been revised upward as follows: Rounds, ⅛-inch, $1, ½-inch, $3 and ⅜-inch, $5 per ton.

Boston—Heaviest volume of concrete reinforcing bar business since the war is up for estimates, largely public work including bridges and housing. Bridges in the Massachusetts highway program involve around 6500 tons, bids closing Jan. 5 on the Needham-Wellesley-Newton-Weston section, one of the largest active projects. Although supply of new billet bars with fabricators and distributors has improved, tonnage about balances heavier demand. Housing project, Cambridge, Mass., 700 tons, went to Northern Steel Co. Medford.

Cleveland — Substantial volume of new construction is in prospect over coming months but meanwhile demand is sluggish, confined to small tonnage jobs. Holiday influences are a factor in the present dullness but not much in the way of active demand is expected until spring. Higher prices are not believed likely to result in deferment of any project now actively being figured.

Seattle—Both local rolling mills resumed operations Jan. 3. Northwest Steel Rolling Mills Inc. contin-



30,000 lb. COILS are "LIGHT WORK"

—with an A-F *ENGINEERED* CONVEYING SYSTEM

COILS OF COLD ROLLED STEEL—weighing as much as 30,000 pounds—are a real test of the strength and durability of any conveying equipment. But they are "light work" to A-F Conveying Equipment.

Here in a leading eastern mill an A-F Engineered Completely Co-ordinated Conveying System includes an automatic tilter which discharges the coils from the conveyor. Many other features in this A-F Conveying System lighten the work of stacking and distributing sheets throughout the mill.

Since 1901, Alvey-Ferguson Engineers have helped thousands of plants to make worth-while economies in handling materials and products. May we discuss modern conveyorized methods with you? Write, without obligation—today.

THE ALVEY-FERGUSON CO.
563 Disney Street Cincinnati 9, Ohio
Established 1901
Offices or Representatives in Principal Cities—Coast to Coast

CONVEYING EQUIPMENT
A-F CONVEYING MACHINERY
Alvey-Ferguson
WASHING MACHINES FOR INDUSTRY

ues to augment its ingot inventory for the mill. Largest project pending is the first unit of Seattle's viaduct, requiring 1500 tons of reinforcing. MacRae Bros., Seattle, are low at $1,193,911, but award is being delayed by a technicality.

San Francisco—Demand is influenced by seasonal factors and business is spotty. Mainstay of the market continues substantial public works projects.

Semifinished Steel . . .

Semifinished Prices, Page 347

Pittsburgh—The original announcement on base price increases on alloy steel products did not cover billets, blooms and slabs. The base for these items has since been advanced $3 per ton to $66 by leading producers.

Extra revisions on semifinished carbon steel forging and rerolling qualities include: Upward adjustment of $1 to $20 per ton in item quantity extras; a new extra of $2 per ton for exact item quantity and an increase of $2 per ton for ARR quality in the specification and tolerance extras listing.

Chemical requirements and tests extras have been revised as: Carbon (low maximums), up $1 per ton; manganese, new ranges and up $1 to $2 per ton; sulphur, up $1 per ton in maximum of range over 0.07 per cent

A new extra of $2 per ton for foreign or outside inspection when specified or required and additional handling involved, has been established.

The new extra card for tight cooperage hoop has a completely revised size extra table starting with thickness range of 0.821 down to .0389-inch and width ranges starting with over 15/16-inch to 3 inches inclusive. Some of the size extras have been increased up to $9 per ton, others reduced up to $3 per ton. Item quantity extras are unchanged except for weight bracket of under 4000 to 2000 pounds which was raised $3 per ton. A new table has been added to the extra card covering permissible variation in shipment, also an item extra of $2 per ton for exact quantity, and detailed table on packaging extras.

Carnegie-Illinois has published for the first time an extra card covering tube rounds. These extras in past have been based on the hot-rolled bar card schedule. The new card includes a schedule covering size, quantity, item quantity and permissible variation from ordered quantity, specification and tolerance extras, also a detailed listing of packaging extras.

The reversed extra card for skelp includes a change in the size extra table covering a broader width range up to over 37 to 42-inch exclusive, and also a broader thickness range of 0.5500 to 0.0610 inch. In general size extras have been increased substantially. The new card also has inaugurated a new listing of quantity extras. The specification and tolerance extras have been revised with an increase of $1 per ton in extra when copper bearing steel is specified, or for any specified minimum, up to and incuding 0.20 per cent.; also an extra for manganese of $1 per ton for over 0.60 to 0.90 per cent inclusive.

Rails, Cars . . .

Track Material Prices, Page 349

Pittsburgh—Base prices advanced $4 per ton on light rails. Extra card revisions include revision in section extras as follows: 30 pounds per yard, up $2 per ton; 25 pounds per yard, up $4 per ton. In addition to $1 per ton increase in base prices for steel axles, upward adjustments in extras include $3 per ton for normalizing and $10 per ton for annealing.

Plates . . .

Plate Prices, Page 347

Philadelphia — Demand for plates shows little change. Higher prices may be temporarily exerting a restricting effect on inquiry, but not much it is believed. Deliveries can still be had within three to four weeks.

Seattle—Demand for plates is seasonally quiet and fabricators have curtailed operations. No large projects are pending.

Boston—Most plate mills lack substantial order backlogs and differences in delivery schedules are narrowing. Three to four weeks' shipments are possible on some gages, less on heavier. Bulk of demand is

Only **MARVEL** *builds all four**

*HACK SAWING MACHINES

*BAND SAWING MACHINES

*BAND SAW BLADES

*HACK SAW BLADES

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds BOTH hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and unbiased recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing machines and metal sawing blades. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in overall performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently—his services are available upon request—gratis.

Write for Catalog 49

ARMSTRONG-BLUM MFG. CO.
5700 BLOOMINGDALE AVE., CHICAGO 39, U.S.A.

MARVEL Metal Cutting SAWS
No. 9A Marvel Hack Saw
No. 8 Marvel Band Saw
MARVEL High-Speed-Edge HACK SAW BLADE
MARVEL Metal-Cutting BAND SAW BLADE

from users of lighter plates on which extras were upped most. Carbon plate fabricating shops are paying up to $4 per ton more in some instances, including extras.

Tubular Goods . . .

Tubular Goods Prices, Page 350

Seattle—The cast iron pipe market is dormant and little interest is expected for 60 days. Alternatives are asked in a majority of biddings, other types being more competitive with cast iron. No price change in this item is reported.

Scrap . . .

Scrap Prices, Page 354

Philadelphia—District scrap prices continue to ease with trading light. Price revisions are largely nominal. No. 1 heavy melting and No. 1 bundles are off nominally to $23.50-$24.00 delivered, No. 2 heavy melting and No. 1 busheling to $22-$23 and No. 2 bundles to $19.50.

Machine shop turnings are steady although mixed borings and turnings have declined to $14.50-$15.50. Bar crop and plate, punchings and plate scrap are lower at $25.50-$26.50 delivered, cut structurals $25-$26, electric furnace bundles $25 and heavy turnings $24. No. 1 chemical borings are higher at $29.

Cast grades are weak with No. 1 cupola available at $33-$34 delivered, No. 1 machinery at $36-$37, charging box and heavy breakable $34-$35, unstripped motor blocks $29-$30 and No. 1 wheels $37-$38. Clean auto cast and malleable are unchanged.

Detroit—Sentiment was mixed as the first of substantial automotive lists appeared for bids. January tonnage of industrial scrap will be up sharply from December, and in the latter month the supply exceeded expectations. With two electric furnace plants in this area figuring to take 65,000 tons of No. 1 scrap monthly a heavy additional bite is being taken beyond what open-hearth melters require, sharply reducing, if not eliminating, the margin by which Detroit always has been a plus-market for industrial material.

Chicago—Trading was at a crawl over the Christmas-New Year's week, one significant development being rejection by one mill of what seemed to the trade to be virtually all the No. 2 bundles received. This grade generally has been in very limited demand locally.

Prices weakened throughout the list, primarily on appraisal, the trade marking time until after Jan. 1 when revival of buying interest is expected.

Some brokers admit 1949 was a satisfactory year financially, the first half when scrap for conversion steel played a significant role offsetting the doldrums of the last half.

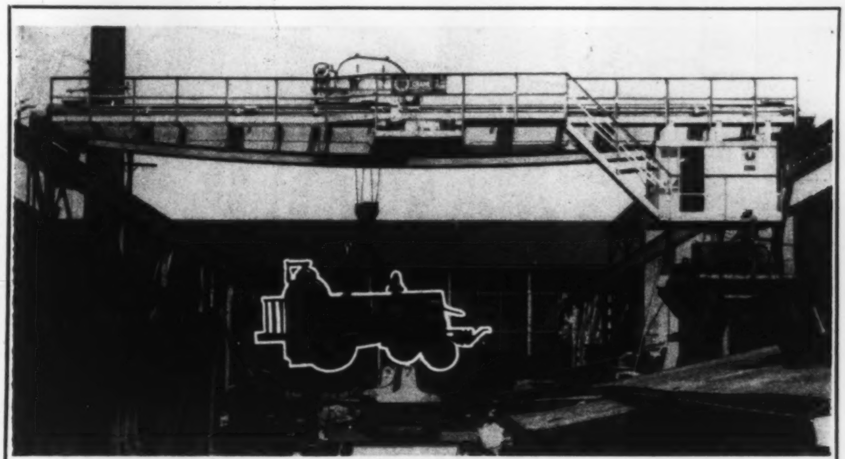
Most brokers would welcome return of normal trading on a commission basis instead of the speculative kind which they say has been forced upon them by reluctance of the mills to buy regularly and of dealers to sell wanted grades. One broker says the situation is such it is necessary to make several dollars profit on grades which the dealers will sell in order to cover their losses on others.

St. Louis—Scrap brokers trimmed prices around $1 last week as mills continued to hold out of the market. Most brokers are covered on short orders and anticipate no new business before mid-January. Price cutting has been spotty and has applied principally to rail scrap. Cast quotations are unchanged with foundry business slow. Mill stocks are close to 60 days and foundry supplies about half that. No. 1 heavy melting steel was marked down 50 cents to $1 last week, but No. 2 was unchanged at $26.

New York—Brokers offering prices f.o.b. shipping point have settled still further as consumer demand is light and most yards have fair stocks.

Brokers are offering $20.50 for No. 1 melting steel and No. 1 bundles. They also are offering $18.00-$18.50 for No. 2 melting and No. 1 busheling. No. 2 bundles still hold around $17.00-$18.00 and machine shop turnings, mixed borings and turnings and short shovel turnings at $11-$12. Punchings and plate scrap, cut structurals and electric furnace bundles are down to $20-$21.

Cast prices are lower with No. 1 cupola $26-$27 and No. 1 machinery $29-$30, charging box and heavy breakable cast have declined to $22-$23 and unstripped motor blocks to $23.



THE OLD LAFAYETTE GETS A LIFT

with a

BEDFORD

15-TON CRANE

When this B.&O. locomotive, the Lafayette, was built back around 1857, all the wealth in the world could not have bought an electric crane. Today the Bedford Foundry & Machine Co., for an unusually mild price, will build electric cranes for anybody; cranes of 5 to 150 ton capacity, any span or lift, and designed to meet your special requirements. We also make structural steel, steel buildings, steel derricks and gray iron castings. Send today for our new catalog.

BEDFORD CRANES SERVICE

BEDFORD FOUNDRY & MACHINE CO.
BEDFORD, INDIANA, U. S. A.
Engineers • Designers • Fabricators

Pig Iron . . .

Pig Iron Prices, Page 346

Philadelphia — January pig iron business is expected to show some improvement over that of December. However, supply will be fully adequate notwithstanding restricted coal mining operations. Certain producers believe a continuation of the present 3-day mining schedule will have no important bearing on pig iron production in this district before the latter part of the winter, although there may be heavier demands for iron from inland districts where the fuel situation is more critical.

Mystic furnace prices for first quarter, foundry and malleable grades, are unchanged. The furnace piled some iron in December but a moderate improvement in demand is expected in January.

Cleveland — Foundry operating schedules are expected to pick up over ensuing weeks as large castings buyers release specifications. This should result in some improvement in merchant pig iron demand though the foundries are holding substantial stocks. The fact that pig iron prices held unchanged in the recent general upward revision of schedules on steel products occasioned no surprise in the pig iron market in view of the sluggish demand for some time past.

St. Louis—Iron demand is perking up moderately, principally among foundries. The pickup is attributable to temporary coal strike and price fears. Some buying for inventory is noted. Pig iron and coke production here is at capacity.

Seattle—Recent offers of British pig iron at about $5 under domestic prices have not been confirmed. Local buyers are not interested since they learned offerings are remelted iron. Some India pig is available as in prewar. Demand for pig iron is dormant. The domestic price is unchanged.

New York—District foundries are showing more interest in coke requirements as a result of the continued restricted schedule in coal mining. However, they are showing no particular concern with regard to pig iron, at least for January. Iron shipments this month should be heavier than in December, but largely for the reason that last month's movement was adversely affected by holiday suspensions at many plants.

JANUARY 1, 1950
RESOLVED
TO SERVE OUR CUSTOMERS
with
ever greater appreciation
ever improved quality
ever increased accuracy
ever widening experience
ever stepped up facilities
in the production of
WIRE FORMS • WIRE PARTS
MECHANICAL SPRINGS
SNAP-CLIP FASTENERS
THE
CUYAHOGA
SPRING COMPANY

Send for complete
Catalog No. 49

A SUBSIDIARY OF
Barium
STEEL CORPORATION
Steelweight to the Nation

The CUYAHOGA SPRING Co.
10200 BEREA ROAD • CLEVELAND 2, OHIO

Structural Bookings Off

New York—Structural bookings for November are estimated by the American Institute of Steel Construction at 101,583 tons compared with a revised total of 158,216 in October. Total for the first 11 months of the year was 1,306,370 tons compared with 1,796,216 in the corresponding period of 1948.

Backlogs stand at only 527,164 tons against 672,550 a year ago.

Warehouse . . .

Warehouse Prices, Page 351

Cleveland—Local steel distributors are adjusting their price and extra schedules upward to compensate for the increases effected by the mills. Changes include a revision in base quantities. Demand currently is slow with many manufacturing plants deferring purchases pending completion of inventory-taking. Warehouse stocks are being gradually restored to prestrike level but difficulty is encountered in obtaining flat-rolled items as quickly as desired.

Boston—In line with mill increases in base prices and extras, warehouses are raising their quotations. Demand for warehouse steel has slackened but hot and cold-rolled sheets are moving well. Distributors of flat-rolled items are exerting considerable pressure on the mills for shipments. Pressure is less noticeable on other products.

Philadelphia—Warehouse prices are expected to reflect the higher mill prices shortly. Certain leading distributors late last week were planning to put at least some changes into effect before turn of the year. Sellers anticipate business improvement in January following a dip in December which was accentuated by holiday influences.

San Francisco—Except for insistent demand for sheets and strip, scarce items in most warehouses, buying is spotty and is affected by seasonal letdowns. Distributors are ordering flat-rolled products heavily.

Seattle—Wholesalers are awaiting further information about mill extras before revising price lists. This is expected momentarily. Threatened increases have not stimulated demand, December turnover having been below normal. With exception of galvanized sheets, stocks are fair.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1900 tons, five story addition to Frederick & Nelson department store, Seattle, to Pacific Car & Foundry Co., Seattle.

1500 tons, estimated, bridges and causeways, Port Orange and Seabreeze, Fla., to Nashville Bridge Co., Bessemer, Ala.; T. A. Loving Co., Goldsboro, N. C., general contractor; reinforcing bars to Virginia Steel Co., Birmingham.

1000 tons, apartment, Simon Bros., 87th street and Fifth avenue, New York, to Harris Structural Steel Co., that city.

425 tons, housing project, Cambridge, Mass., to Builders Iron Works, Somerville, Mass.; C. J. Maney Co., Boston, general contractor.

200 tons, addition, Memorial Hospital, Manchester, Conn., to Standard Steel Construction Co., Hartford, Conn., general contractor.

100 tons or more, school building, West Hartford, Conn., to Haarmann Steel Co., Holyoke, Mass.; A. F. Peaslee Co., Hartford, general contractor.

100 tons or more, school building, Wallingford, Conn., to Berlin Construction Co. Inc., Berlin, Conn.; W. J. Megin, Inc., Naugatuck, Conn., general contractor.

STRUCTURAL STEEL PENDING

12,000 tons, galvanized steel transmission towers; American Bridge Co., Pittsburgh, low $2,296,758 to Bonneville Power Administration.

6500 tons, Severn River state bridge, Maryland; Harris Structural Steel Co., New York, low.

556 tons, state bridge work, Carbon county, Pennsylvania; bids Jan. 20.

350 tons, proposed addition to Securities building garage, Seattle; plans in preparation.

300 tons, first unit Seattle viaduct; MacRae Bros., Seattle, low.

Unstated, balcony addition to University of Washington stadium, including 145-foot cantilevered roof, Seattle; bids to Board of Regents Jan. 10.

Unstated, bridges, control gates, etc., West canal, Columbia Basin project; bids in to Bureau of Reclamation.

REINFORCING BARS . . .

REINFORCING BARS PLACED

700 tons, housing project, Cambridge, Mass., to Northern Steel Co., Medford, Mass.; C. J. Maney Co., Boston, general contrator.

360 tons, Park Towers apartments, Tacoma, to Bethlehem Pacific Coast Steel Corp., Seattle; Wick & Dahlgren, Seattle, general contract.

250 tons, bridges and highway, Leominster, Mass., to Truscon Steel Co., Boston; Bayer & Mongolla Co., Worcester, general contractor.

170 tons, highway and bridge construction, Harvard-Littleton, Mass., to Northern Steel Co., Boston; Carlo Bianchi & Co., Framingham, Mass., general contractor.

125 tons, bear grotto for Seattle Park department, to Bethlehem Pacific Coast Steel Corp., Seattle; Fiksdal & Ness, Seattle, general contract.

120 tons, intercepting sewer, Section B, Blackstone Valley Sewer district, Providence, R. I., to plantation Steel Co., Providence; Marinucci Bros. & Co., Boston, general contractor.

REINFORCING BARS PENDING

1500 tons, first unit Seattle viaduct; MacRae Bros., Seattle, low $1,193,911.

750 tons, 14½-mile west canal, Columbia Basin project; bids in.

688 tons, state highway development, Lawrence county, Pennsylvania; bids Jan. 20.

450 tons, Jim Creek navy transmission station, Washington state; bids in.

100 tons, Washington state highway jobs; bids to Olympia Jan. 10.

PLATES . . .

PLATES PLACED

320 tons, covers for Portland, Oreg., sewage system project, to Consolidated Western Steel Corp., Seattle.

PLATES PENDING

450 tons, H-piling, Seattle viaduct; general bids in.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Louisville & Nashville, 52 diesel-electric locomotives, funds appropriated for purchase List includes 37 1500-horsepower road freight locomotives, nine 660-horsepower switch engines and six 1000-horsepower or 1200-horsepower switch engines.

RAILROAD CARS PLACED

Missouri Pacific, 60 steel caboose cars to its De Soto, Mo., shops.

Northern Pacific, 500 fifty-ton boxcars and 50 caboose cars, to own shops at Brainerd, Minn.

RAILROAD CARS PENDING

Louisville & Nashville, 500 box cars, funds appropriated for purchase.

RAILS PENDING

United States district engineer, Walla Walla, Wash.; relocation of Union Pacific Railway trackage, a McNary dam project, involving 3430 tons of 133.4 lb rail, also joint bars, tie plates, bolts, spikes, etc.; bids asked Jan. 20.

REDUCE LOST TIME due to REFRACTORY REPLACEMENT

The labor and materials used for refractory replacement are a terrific drag on production time. You can retrieve these wasted hours by eliminating the cause—and the best way is to USE GLOBE SUPERIOR LADLE BRICK. Wire cut or dry pressed, they will bring about CLEANER STEEL, LOWER PER TON BRICK COST, and SAVE TIME LOST IN REFRACTORY REPLACEMENT.

SERVING THE STEEL INDUSTRY SINCE 1873

The GLOBE Brick Co.

EAST LIVERPOOL, OHIO

PORTER CUTTERS
& PRUNING TOOLS

A complete line of one - and two-hand metal and wood cutting tools that multiply hand power approximately 80 times.

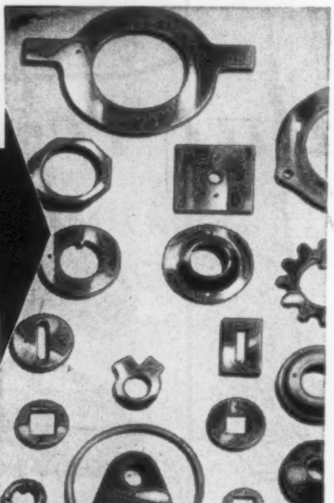
Cutters in both rigid and swivel types with capacities up to ¾" bolts and ⅝" soft rods. *Chain Cutters* for hard and soft chain. Tire chain link repair tools. Nut splitters. Also wire cutters for all wire, wire rope, cable, flat bar stock and steel strapping. Special cutters for industry.

Powerful *Forester* Lopping Shears with capacities up to 2" greenwood. *Point-cut* and *Twin-cut* Pruners for fruit, nursery and horticultural work—Pole Pruners that are preferred by tree surgeons, utilities, and fruit growers. All made to cut clean and promote quick healing.

Sold at leading hardware, mill supply and farm implement stores—the world over.

Ask for catalogs of Porter Cutting Tools, Porter Pruning Tools or Porter-Ferguson Hydro-Method

H. K. PORTER, INC., Somerville 43, Mass.



Since 1887

MILWAUKEE WROT WASHERS

Better WASHERS
. . . Competitively Priced

Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*

WROUGHT WASHER
MANUFACTURING CO.
The World's Largest Producer of Washers
2103 S. BAY ST., MILWAUKEE 7, WIS.

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

SAN FRANCISCO—Leslie Salt Co. has plans to build a $175,000 office and warehouse building. Construction will start this month.

SAN LEANDRO, CALIF.—Andre Paper Box Co. has started construction of a $250,000 box factory.

SAN LEANDRO, CALIF.—Golden State Co., western dairy firm, announces plans to build a $100,000 distributing plant. Golden Grain Macaroni Co. also will start construction of a $500,000 factory.

DELAWARE

DOVER, DEL.—Cannon Motors Inc., automobiles and farm machinery, has been chartered by the corporation department of the secretary of state's office.

DOVER, DEL.—George R. Keller Inc., machinery, has been chartered by the corporation department of the secretary of state's office.

DOVER, DEL.—Everhart & Bono, paving and construction machinery, has been chartered by the corporation department of the secretary of state's office.

WILMINGTON, DEL.—Wilmington Water Department received bids for contracts to begin a $2.7 million expansion and improvement program for the city's water distribution system.

WILMINGTON, DEL. — New construction, alterations and additions, estimated to cost $1,575,275, in New Castle county, were authorized during November.

OHIO

BELLEFONTAINE, O.—National Extrusion & Mfg. Co. has leased the former National Brass Co. building on North Elm street & Orchard avenue, and will start manufacturing shortly. National Extrusion is a new concern which will process aluminum and brass products.

CALDWELL, O.—Lawrence Mining Co. has been chartered through Lawrence King, RFD 3, to deal in coal, coke and coal products. Incorporators are E. R. Snead, Ian R. Carswell and Salvatore Di Bartolo.

IRONTON, O.—Ironton Castings Co., formerly known as Foster Stoves & Plant Repair Co., has been purchased by W. W. Weber of Lancaster, O.

FERROALLOYS

(*Continued from Page* 351)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

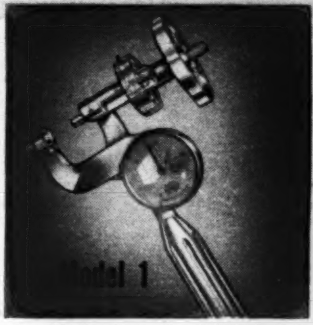
Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

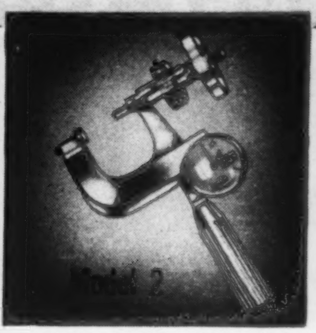
25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c., f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Ames Precision HARDNESS TESTERS
FOR ROCKWELL HARDNESS TESTING

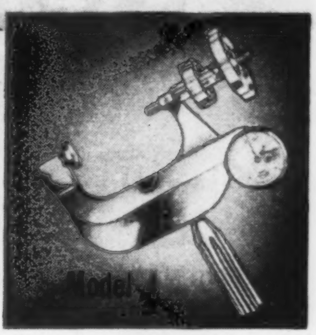
Today, hardness testing is coming into universal use as a necessity in the working and fabricating of metals. With Ames Testers, readings are made accurately, quickly, on-the-spot, directly in the Rockwell Hardness Scales.



For testing round and flat stock, tubing, saws, knives, etc., up to one inch in Rockwell A, B and C Scales. Weighs only 1½ lbs.



For testing rounds and flats, dies, odd-shaped pieces, etc., up to two inches in Rockwell A, B and C Scales. Weighs 2½ lbs.



For testing up to four inch capacity directly in Rockwell A, B and C Scales. Throat depth two inches. Weighs 3¼ lbs.

Cast Iron Bench Stand permits use of both hands when testing small parts. Tester is inclined at convenient angle and is firmly clamped in stand

Box for Tester and Accessories Equipment includes diamond and 1/16" ball penetrators, two anvils, two steel test blocks, one brass test block and Rockwell Conversion Chart.

AMES PRECISION MACHINE WORKS
WALTHAM 54, MASS.

Finished, Assembled Parts Represent TRUE Costs

ELECTRIC FURNACE
C STEEL CASTINGS

Steel castings produced true to pattern—sound and clean, readily fitted to jigs, machinable in a minimum of time and quickly assembled into your equipment—represent the ONLY actual and true cost of steel castings.

We furnish this quality of product. And, by cooperating with your engineers in matters of design and pattern construction, assist you to secure castings of minimum weight, maximum strength and utmost economy of machining and assemblage.

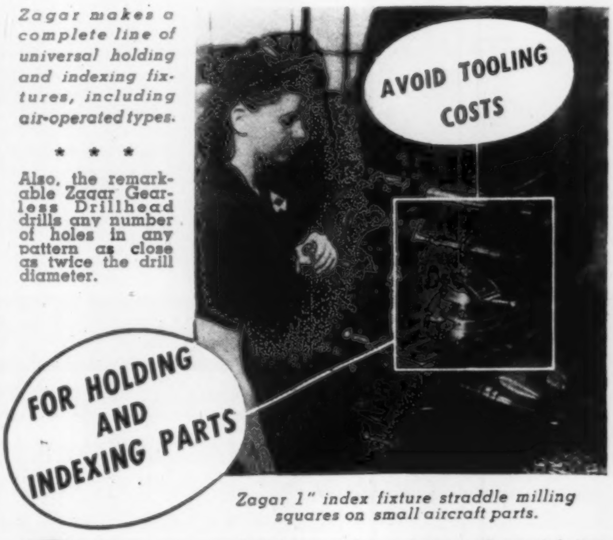
Quality controls throughout our plant assure consistent uniformity, thorough dependability and a product that is economical to use in your equipment; whether it be ships, turbines, trucks, railroad equipment or what-not.

CRUCIBLE STEEL CASTING CO.
LANSDOWNE, Del. Co., PENNA.

Zagar makes a complete line of universal holding and indexing fixtures, including air-operated types.

* * *

Also, the remarkable Zagar Gearless Drillhead drills any number of holes in any pattern as close as twice the drill diameter.


AVOID TOOLING COSTS
FOR HOLDING AND INDEXING PARTS

Zagar 1" index fixture straddle milling squares on small aircraft parts.

GET NEW, LOWER PRICES ON RELIABLE ZAGAR COLLETS

Sizes 1/16" to 2 1/8" diameter, hexes, squares and soft blanks.

Avoid expensive set-ups and special jigs and fixtures by using the same Zagar chuck for a great variety of jobs. **Merely change collets from job to job.** Depend upon this low-cost, accurate method of holding and indexing; easy, quick, time-saving, production-increasing. Ideal for milling, drilling, shaping, tapping, grinding and other kinds of machining, especially on short runs. Write for a free demonstration on that tough application.

Ask for Catalog S-1.

ZAGAR TOOL INC.
24000 Lakeland Blvd., Cleveland 23, Ohio

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

THERE'S A DEFINITE SAVING OF
ASSEMBLY TIME
WHEN YOU USE...

UNBRAKO KNURLED

SOCKET HEAD CAP SCREWS

The *Knurled* Head of the "UNBRAKO" Socket Head Cap Screw does triple duty: (1) the *Knurling* provides a sure, slip-proof grip; (2) the *Knurling* speeds assembly, because it enables the "UNBRAKO" to be screwed in faster and further with the fingers—handiest of all wrenches—before a "key" becomes necessary; (3) the *Knurling* permits positive locking. Available in both National Coarse and National Fine Thread Series, in full range of standard sizes. Other sizes to special order. Write for your copy of the "UNBRAKO" Catalog.

Knurling of Socket Screws originated with "Unbrako" in 1934.

Other "Unbrako" Products Include:

Self-Locking Socket Set Screws with Knurled Cup Points, Self-Locking Socket Set Screws with Knurled Threads, Self-Locking Square Head Set Screws with Knurled Cup Points — all patented, self-locking screws that won't shake loose! Knurled Socket Head Stripper Bolts, *Precision-Ground* Dowel Pins. *Fully-Formed* Pressure Plugs.

SPS STANDARD PRESSED STEEL CO.
BOX 579, JENKINTOWN, PENNSYLVANIA
"UNBRAKO Counts with the Men who Count"

SNAGGING

Get on with production. Do your snagging quicker, cleaner, *safer!* With Electro HIGH SPEED SNAGGING WHEELS *engineered to your job,* you'll see costs come down and volume of *better output* go up. These wheels work *on* anything *from* anything—swing frames, floor stands or portable machines. Full details illustrated in full color in our new Grinding Wheel Manual No. 645. Send for it *now.* It's *free.*

Service from Los Angeles or Buffalo

Electro SINCE 1919

K-239

Electro REFRACTORIES & ALLOYS CORPORATION
Mfrs. • Refractories • High Speed Grinding Wheels • Crucibles • Alloys
344 DELAWARE AVE. BUFFALO 2, N. Y.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l., lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.40c per lb of alloy, ton lots packed 8.80c, 200 to 1999 lb 9.15c, smaller lots 9.65c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo. each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%. Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

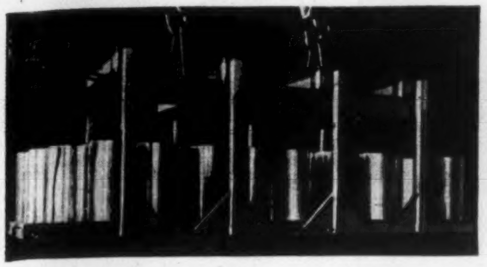
Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

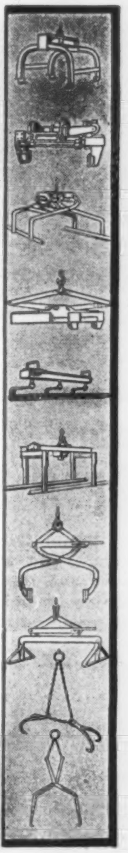
Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%. Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special**





100,000 POUNDS OF ALUMINUM

You may not have 100,000 lbs. to lift in one bite, like the Aluminum Company of America, but Mansaver can supply a grab for *ounces*, if necessary. All are easy to operate. The massive grab shown above, Style 1142, opens and closes with a pull of not over 40 lbs. on the hand wheel!

Write us about your load!

COMPLETE YOUR CRANES WITH

MANSAVER GRABS

Mansaver Industries, Inc., 3101 East St., New Haven, Conn.

SEASON'S GREETINGS

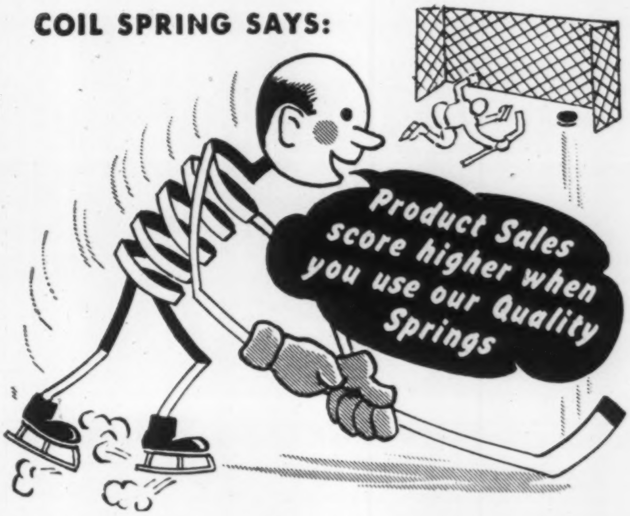
from

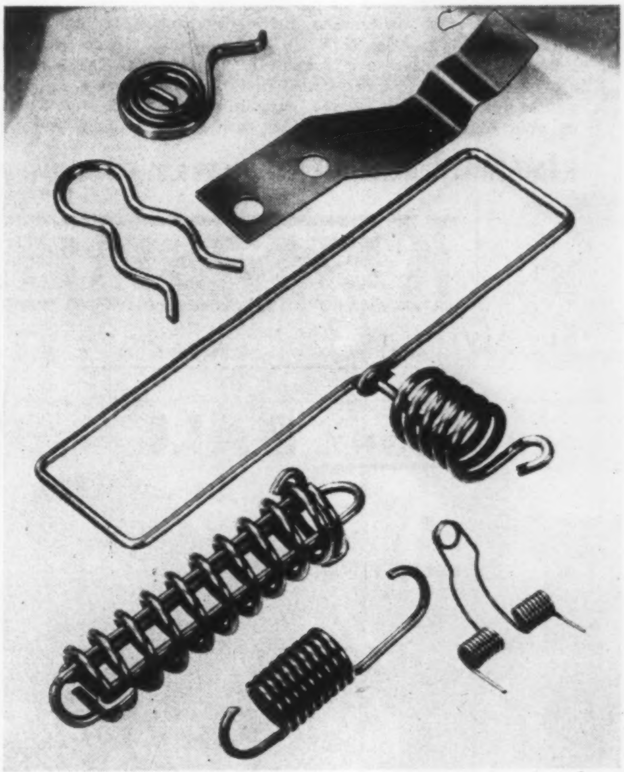
Chicago
STEEL PRODUCTS
Warehouse Association

★

Block Steel Corp.
Briggs & Turivas, Inc.
Chicago Metals Co.
W. R. Cox Steel Co.
Friedman Bros. Steel Co.
Gary Steel Supply Co.
Gordon Steel Co.
Production Steel Co.
Shannon Steel Co.
Shelley Steel Corp.
Universal Sheet & Strip Co.
Weiss Steel Co., Inc.
Western Sheet Steel Co.

COIL SPRING SAYS:


Product Sales score higher when you use our Quality Springs



Looking for a way to improve your product sales-wise? Examine its spring parts. Are they built for durable service—or just getting by? Are they produced for you economically? exactly to specifications? delivered on time? If you're not getting the spring service you need, U. S. Steel Wire Spring can help you. Just call MIchigan 6318.

No order too large or too small

The U. S. STEEL WIRE SPRING Co.
7800 FINNEY AVE. • MIchigan 6318
CLEVELAND 5, O.